DEVELOPMENT OF APPROPRIATE FOOD MENUS FOR LOCAL PREGNANT WOMEN IN UBONRATCHATHANI PROVINCE

PIYARAT TUNWETCHASIN

A THESIS SUBMITTED IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR

THE DEGREE OF MASTER OF SCIENCE

(FOOD AND NUTRITION FOR DEVELOPMENT)

FACULTY OF GRADUATE STUDIES

MAHIDOL UNIVERSITY

2000

ISBN 974-664-981-7

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Piyarat T.
.....
Miss Piyarat Tunwetchasin
Candidate

Thara Viriyapanich
.....
Assoc.Prof. Thara Viriyapanich, M.Sc.
Major-advisor

Prapaisri P. Sirichakwal
.....
Assist.Prof. Prapaisri P Sirichakwal, Ph.D.
Co-advisor

.....
Assoc.Prof. Visith Chavasit, Ph.D.
Co-advisor

Prakairat Sukumalchart
.....
Asst.Prof. Prakairat Sukumalchart, M.S.
Acting Dean
Faculty of Graduate Studies

Songsak Srianujata
.....
Assoc.Prof. Songsak Srianujata, Ph.D.
Chairman
Master of Science Program in
Food and Nutritional Toxicology
Institute of Nutrition

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was submitted to the Faculty of Graduate Studies, Mahidol University
for the degree of Master of Science (Food and Nutrition for Development)
on
November 3, 2000

Piyarat T.
.....
Miss Piyarat Tunwetchasin
Candidate

Thara Viriyapanich
.....
Assoc.Prof. Thara Viriyapanich, M.Sc.
Chairman

Prapaisri P. Sirichakwal
.....
Assist.Prof. Prapaisri P Sirichakwal, Ph.D.
Member

Sangsom
.....
Dr. Sangsom Sinawat, M.D., M.Sc.
Member

Visith Ch
.....
Assoc.Prof. Visith Chavasit, Ph.D.
Member

Prakairat Sukumalchart
.....
Asst.Prof. Prakairat Sukumalchart, M.S.
Acting Dean
Faculty of Graduate Studies
Mahidol University

Songsak Srianujata
.....
Assoc.Prof. Songsak Srianujata
Ph.D.,
Director
Institute of Nutrition
Mahidol University

ACKNOWLEDGEMENT

I would like to express my sincere gratitude and deep appreciation to Assoc. Prof. Thara Viriyapanich, my advisor for her kindness, guidance, encouragement and constructive criticism throughout the study which enable me to carry out this thesis successfully. I wish to express my sincere thankfulness to my co-advisor, Assist.Prof. Prapaisri P Sirichakwal, Assoc.Prof. Visith Chavasit for their kindness, help and valuable comments and suggestions.

Appreciation is also extended to Mrs. Orapin Banjong for her valuable and timely advice throughout the development of the fieldwork. I am very grateful to all staff members of Nutrition Communities section, especially, Mrs. Patsamai Eakkantrong and Miss Sopa Tummachodtiphong, for their helpful guidance and assistance. Sincere appreciation is also extended to the villager of both rural and urban of Ubonratchathani province for their co-operation and participation in this study. Grateful acknowledgements are extended to Mrs. Suwannee Promchan and all staff members of Institute of Nutrition, Ubonratchathani province, for their fieldwork assistant. Special thanks to all my friends for their help, encouragement and moral support, Deep appreciation is likewise extended to WHO and FAO for their research grant.

Finally, I express the most gratitude to everyone in my family for their love, understanding, encouragement, moral support and confidence to me, especially Mrs. Sukanya Tunwetchasin, my mother whom I love the most.

Piyarat Tunwetchasin

4036091 NUFN/M : MAJOR : FOOD AND NUTRITION FOR DEVELOPMENT; M.Sc.
KEY WORD : PREGNANT WOMEN/ NUTRIENT INTAKE PER DAY/ FOOD MENUS

PIYARAT TUNWETCHASIN : DEVELOPMENT OF APPROPRIATE FOOD MENUS FOR LOCAL PREGNANT WOMEN IN UBONRATCHATHANI PROVINCE. THESIS ADVISORS: THARA VIRIYAPANICH, M.Sc., PRAPAISRI P SIRICHAKWAL, Ph.D., VISITH CHAVASIT, Ph.D. 124 p. ISBN 974 – 664 – 981 - 7

Maternal nutrition has an important influence on the course and outcome of conception. Proper nutrition during pregnancy influences the growth and development of the fetus and the well-being of a pregnant woman. Viriyapanich, T. et al reported that the average nutrient intake per day of pregnant women in urban and rural areas of Ubonratchathani (Ubon) Province were inadequate especially for calcium, vitamin A, and iron which were lower than 50%RDA.

To develop food menus which were appropriate for local pregnant women, Ubon Province was selected as the model for the northeast. The studied areas classified as urban communities included Muang and Warinchamrap districts, and Trakarnphutphon, Nayear and Khong Chiam districts represented rural communities. Both areas were surveyed for local available foods. This study aimed to develop 5 appropriate menus. 3 of the 5 developed menus for each area were chosen as food menu guideline prototypes. A home-use acceptability test was used to evaluate the sensory acceptability and practicality of the recipes by using balanced incomplete block design with 30 subjects for each recipe. The results showed that there were more variety and diversity of food in the urban areas than in the rural areas. However, people in rural areas could find nutrient-rich foods from natural sources, mobile venders, self-production, grocery stores and their weekly markets. Omelets with canned sardines in tomato sauce, chicken curry with pumpkin and glutinous rice cooked with dehulled mungbean and peanut were tested in rural areas, while omelets with canned sardines in tomato sauce, fried rice with canned sardines in tomato sauce and fried tofu with vegetables and pork were tested in urban areas. Results of the acceptability and the practicality tests showed all subjects in both areas accepted the food guidelines. 66-97% of the subjects accepted these menus on the basis of convenience for cooking, acquisition of ingredients and suitable amount of ingredients. Fifty percent of the subjects in urban areas suggested to change certain ingredients in the omelets with canned sardines in tomato sauce. 57-91% of the subjects in both areas prefered these foods. This food menu guideline for pregnant women was developed and will be distributed to pregnant women in the future.

4036091 NUFN/M : สาขาวิชา : อาหารและโภชนาการเพื่อการพัฒนา ; วท.ม.

(อาหารและโภชนาการเพื่อการพัฒนา)

ปิยารัตน์ ตันเวชศิลป์ : การพัฒนาอาหารที่เหมาะสมสำหรับหญิงตั้งครรภ์ในท้องถิ่น จ. อุบลราชธานี (DEVELOPMENT OF APPROPRIATE FOOD MENUS FOR LOCAL PREGNANT WOMEN IN UBONRATCHATHANI PROVINCE) คณะกรรมการควบคุมวิทยานิพนธ์ : ธรา วิริยะพานิช, M.Sc., ประไพศรี ศิริจักรวาล, Ph.D., วิสิฐ จะวะสิต, Ph.D. 124 หน้า
ISBN 974 – 664- 981 - 7

อาหารสำหรับหญิงตั้งครรภ์มีความสำคัญต่อการเติบโตของทารกในครรภ์ หญิงตั้งครรภ์มีความต้องการพลังงาน, โปรตีนและสารอาหารอื่นๆเพิ่ม เพื่อใช้ในการสร้างเนื้อเยื่อของทั้งแม่และลูก ดังนั้นการได้รับสารอาหารที่เพียงพอจะทำให้ทารกเจริญเติบโตได้ดี จากการศึกษาของธรา วิริยะพานิช และคณะ พบว่าหญิงตั้งครรภ์ทั้งในเขตเมืองและเขตชนบทของจังหวัดอุบลราชธานีได้รับสารอาหารยังไม่เพียงพอ โดยเฉพาะแคลเซียม, วิตามินเอ และเหล็กซึ่งได้ต่ำกว่า 50% ของปริมาณที่แนะนำให้บริโภคต่อวัน

การศึกษานี้จึงมีวัตุประสงค์ที่จะพัฒนาสูตรอาหารและคู่มืออาหารที่เหมาะสมสำหรับหญิงตั้งครรภ์ในชุมชน โดยใช้จังหวัดอุบลราชธานีเป็นต้นแบบ พื้นที่ในการศึกษาแบ่งออกเป็นชุมชนเมืองประกอบด้วย อ. เมืองและ อ.วารินชำราบ ส่วนชุมชนชนบทประกอบด้วย อ.ตระการพืชผล, อ.นาเยีย และ อ. โขงเจียม นอกจากนี้ยังได้สำรวจอาหารที่มีในชุมชนจากตลาดทั้งในเมืองและชนบท ข้อมูลเหล่านี้ถูกนำไปใช้ในการพัฒนาสูตรอาหารที่เหมาะสม 5 เมนูในแต่ละพื้นที่ เลือก 3 เมนูของแต่ละพื้นที่มาจัดทำคู่มืออาหารหญิงตั้งครรภ์ต้นแบบ โดยมีรายละเอียดของส่วนประกอบ, ขั้นตอนการปรุง และคุณค่าทางโภชนาการ พร้อมกันนั้นได้ทำการทดสอบการยอมรับในกลุ่มหญิงตั้งครรภ์ทั้งในแง่รสชาติ และความสามารถในการปฏิบัติได้จริงในท้องถิ่นโดยใช้การทดสอบแบบ home-use อาหารในแต่ละเมนูจะถูกทดสอบโดยหญิงตั้งครรภ์จำนวน 30 คน (ใช้ Balanced Incomplete Block design ในการคำนวณจำนวนครั้งที่อาหารถูกทดสอบ) ในเขตเมืองอาหารจะมีหลากหลายและหาได้ง่ายกว่าในชนบท แต่ในชนบทก็สามารถหาอาหารที่มีคุณค่าทางโภชนาการได้ทั้งจาก ธรรมชาติ, พ่อค้าเร่, เพาะปลูก/เลี้ยง, ร้านค้าและตลาดสดในหมู่บ้าน การทดสอบการยอมรับสูตรอาหารและคู่มืออาหารต้นแบบของหญิงตั้งครรภ์ในแต่ละพื้นที่ ได้ทำการคัดเลือกไข่เจียวปลากระป๋อง, แกงไก่ใส่ฟักทอง และข้าวเหนียวหน้าถั่วสำหรับพื้นที่ในชนบท และคัดเลือกไข่เจียวปลากระป๋อง, ข้าวผัดปลากระป๋อง และเต้าหู้ทรงเครื่องสำหรับพื้นที่ในเมือง ผลการทดสอบ พบว่า 100% ของหญิงตั้งครรภ์ทั้ง 2 พื้นที่สามารถเข้าใจและปฏิบัติตามคู่มือได้ง่าย ประมาณ 66-97% เห็นว่าส่วนประกอบและการเตรียมอาหารในแต่ละเมนูเหมาะสมและสามารถทำได้ง่าย มีเพียง 50% ของหญิงตั้งครรภ์ในเมืองที่เห็นว่าควรมีการเปลี่ยนแปลงส่วนประกอบของไข่เจียวปลากระป๋อง และประมาณ 57-91% ของหญิงตั้งครรภ์ทั้ง 2 พื้นที่ชอบอาหารเหล่านี้

จากการศึกษานี้ได้มีการจัดทำคู่มืออาหารหญิงตั้งครรภ์เพื่อนำไปเผยแพร่ให้แก่หญิงตั้งครรภ์นำไปปฏิบัติต่อไป

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CHAPTER I

INTRODUCTION

The quality of life of population is an important factor for the development of the country in terms of social and economic. Quality of life comes from good nutrition, which must begin from early pregnancy.

The effect of mother's nutrition on newborn health has been understood since 1985. Nutrients transferred from mother are used for fetus development (1). Undernourished pregnant women may face critical health problem like toxemia, anemia and leads to low birth weight babies (less than 2,500 g) (2). Therefore, pregnant women usually need extra energy, protein and other nutrients for maternal tissues, the increased metabolism and for the growth of the fetus. Many studies indicated that proper nutrition during pregnancy influences growth and development of the fetus and well being of the pregnant women. Furthermore, maternal weight and weight gain during pregnancy highly influence on infant birth weight, birth length, head circumference and placental weight. In particular, some studies on the fetal origins of adult disease has demonstrated that the pattern of fetal growth is a strong predictor of later susceptibility to diseases of affluence such as cardiovascular disease, non-insulin dependent diabetes, hypertension and hyperlipidaemia (3,4). The prevalence of low birth weight babies is a major public health problem and may also be a serious obstacle to national development. In Thailand, the evidence of low

birth weight babies in 1997 was about 6.5%, however the evidence was up to 7.5% in the northeast (5). Certain studies also showed that Thai pregnant women still have poorly nutritional status (6).

According to Thailand 8th National Economic and Social Development Plan (1997-2001), which focused on the quality of life of the people, malnutrition problem of mother is the very first priority to be solved. However, most of the recommended supplementary food menus for pregnant women available were usually based on western and urban ways of cooking and consumption. While, the problem was found mainly in rural areas which many recipes had different eating and cultures. Such food menus were therefore unacceptable and that could be one of the main reasons for malnutrition problem of Thai pregnant women, especially in rural area. Therefore, the menus that are suitable for a community are needed to be developed and tested for acceptability, in order to be used as the appropriate and practiced guideline for people in the community.

Objective of the study

General objective

To develop food menus which were appropriate for local pregnant women based on the developed process by using urban and rural areas of Ubonratchathani Province as the model.

Specific objectives

1. To survey on eating habits, local food available and method of cooking used in the study areas
2. To introduce locally available food dishes and commercial food products for including in the menu of pregnant women
3. To formulate the food menus for pregnant women, which were prepared by using locally available foods and cooking methods
4. To test for the acceptability and cooking practicality of the formulated menus
5. To develop a guideline for formulating appropriate food menus for local pregnant women

CHAPTER II

LITERATURE REVIEW

2.1 Sequence of prenatal development (7,8)

Growing from one single cell to a complex organism with millions of cells in just 40 weeks of pregnancy is quite a feat but every human being has done so.

There are three distinct development stages of prenatal life. The first, blastogenesis, occupies the first two weeks following fertilization. The fertilized egg (zygote) immediately divides into two cells, each of which then divided into two more, and so on. The zygote soon becomes a cell-lined hollow sphere, the blastula. While cell division is taking place, cell enlargement does not occur because there is as yet no source of nourishment for the zygote, which remains the same overall size as the original ovum despite the rapid proliferation of cells. As the cells continue to divide, two layers are distinguished. The inner cell mass will become the embryo, and the outer "feeding" layer or trophoblast will differentiate to form the placenta. At this point the blastula becomes attached to the wall of the uterus. The trophoblast penetrates the uterine lining and absorbs material from the lining to provide the first nourishment for the new organism.

Meanwhile the inner cell mass is separating into two spherical forms. Separated by the thin cellular disc. This disc will become the embryo itself; one of the spheres becomes a yolk sac (which in humans does not contain yolk) and the other becomes a fluid-filled sac, the amnion, which will provide a protective environment as well as nourishment for the embryo. In the embryonic stage the embryonic disc begins

to differentiate into three types of cells, the germinal layers. The ectoderm or outermost layers of cells will form the brain, nervous system, hair, skin and sensory organ. The mesoderm or middle layer will provide the body's supporting structures- bone, muscle, connective tissue, and parts of the cardiovascular, excretory, and reproductive systems. The innermost layer or endoderm will form the lining of the respiratory, urinary, and digestive tracts. Sixty days (eight weeks) after fertilization the embryonic stage is completed, and many components of the skeleton, brain, eyes, ears, heart and lungs are fully formed.

With the start of the third gestational month, the embryo is considered a fetus, The fetal stage of development, which continues until birth, is the time of rapid growth. The specialized cells continue to divide and now also begin to grow of size. What at 3 weeks had been a tiny embryo weighing only 6 g by 24 weeks has grown to about 30 cm and 640 g At the time of birth, the fully grown fetus will measure around 50 cm and about 3,500 g.

The information that guide this dramatic progression from blastocyst to newborn baby is precisely programmed in the genetic material carried by the egg and the sperm. Apparently there is a different genetic timetable for the development of each body system, and each is vulnerable to nutritional insult. Each system- muscular, skeletal, circulatory, and so on- develops at its own particular rate and pattern. Research on laboratory animals, for example, indicates that restricted maternal protein intake during a critical period of fetal nervous system development causes the offspring's brain to have less than the normal number of cells. The same short-term nutritional deficiency that might affect nervous system growth may have a little effect on another body system that not at a similar critical developmental stage.

Nutrient needs during the embryonic stage are so infinitesimal that only severe malnutrition on the part of the mother would have a significant effect. Fetal nutrient requirements increase during pregnancy and are greatest during the last trimester, when expansion of both the size and the number of cells are greatest.

When nutritional deficiencies continue throughout the term of pregnancy, every body system is in someway affected. In various studies, pregnant animals placed on restricted diets have consistently produced offspring of low birth weight, reduce brain cell number and head size, and proportionate reductions in the size of various body organs. Nutrition is not the only time-specific influence on fetal development. The potentially harmful effects of drugs such as Thalidomide or illnesses such as German measles are also keyed to developmental stages of specific systems.

2.2 Nutrient needs in pregnant women

During pregnancy, the body's requirement for food differs from those of normal non-pregnant women. All dietary essentials are increased proportionately to supply the additional demands of the mother and the growing fetus. The fetus requires nutrients for all of the major metabolic processes involved in energy production, cell and tissue growth and maintenance of structures and function (9-11). It will, to a certain extent, deplete maternal nutrient stores if necessary to supplement what is provides by the mother's food intake. The demands placed on maternal organs, and normal maintenance of the mother's health, must also be considered.

Energy Total energy need for pregnancy can be divided into three parts 1) the obligatory need for energy deposited in fetal, uterine and mammary tissue; 2) maternal fat storage; and 3) the additional energy expended in association with basal

metabolism of the newly synthesized tissues (12). Hytten's estimate that the total extra energy needs of pregnancy amount to 335 MJ (80,000 kcal) or about 1.2 MJ/d (285 kcal/d; 13). To supply this, the FAO/WHO/UNU recommended that, an extra 285 kcal/d over the 280 days of pregnancy, or about 150 kcal/d in the first trimester and 350 kcal/d during the second and third trimesters for well-nourished pregnant women in developed countries (14). While, Prentice AM. et al., 1996 recommended that average energy costs by trimesters are 95, 260 and 430 kcal/d, respectively (15).

However, it appears that energy metabolism differs greatly among women during pregnancy depending on their situation during pregnancy. So, King JC. et al., 1994 suggested that additional energy requirement during pregnancy was difference depending on maternal energy status (12).

Protein serves as the structural building maternal for synthesis of hormones, cells and tissues in the fetus, the placenta and mother herself (11). The recommended protein allowance for non- pregnant women is 44 g/d. There is little demand for additional protein in the early months of pregnancy. This is fortunate, since may women do not realize they are pregnant for sometime, particularly if they do not experience morning sickness. By the second months of pregnancy, however, an extra 7 g/d of protein is recommended (16).

Vitamin A. is an essential nutrient for all animal species because of the critical role in reproduction, the immune system, and vision, as well as in the maintenance of cellular differentiation. These roles are particularly critical during periods of proliferative growth and tissue development, as in pregnancy, infancy, and early childhood (17). The fetus starts to accumulate vitamin A during the third trimester of pregnancy, and needs several months of sufficient intake after birth to build up an

adequate hepatic store. In many countries, babies are breast-fed, in which case the vitamin A content of breast milk is of primary importance. The composition of breast milk is influenced by the vitamin A status and serum concentrations of the mother during the last trimester of pregnancy (18).

An adequate vitamin A status, one that is neither too low nor too high, is needed for harmonious fetal and child development. In practice, practical recommendations very greatly according to the endemicity of inadequate vitamin A status, vitamin A availability, and socioeconomic constraints of the country being considered (19).

Calcium is one of the most important elements of the diet for the pregnant women. It is involved in several metabolic processes, including energy activation, hormonal function, blood coagulation, muscle contractility, nerve transmission and membrane transport (11,20). The body needs calcium throughout life, especially during the periods of growth, pregnancy and lactation. During pregnancy and lactation, calcium is needed for the calcification of fetal bones and teeth and for the storage of the mother to meet the demands of lactation.

Several changes in calcium metabolism associated with pregnancy facilitate the transfer of calcium for mother to fetus, maintain proper maternal serum and bone calcium. Parathyroid hormone and calcitonin, the calcium regulating hormones, which affect intestinal absorption, renal reabsorption, and bone turnover of calcium (20-22). If pregnant women's diet is inadequate of calcium, she will have to sacrifice calcium from her bone for the developing fetus.

Iron is a major raw material for maintaining red blood cell synthesis in both the mother and the fetus. About 290 mg of iron are required for additional hemoglobin as the mother's blood volume expands. Another 134 mg are stored in the placenta and a

final 246 mg goes to the blood and body stores. And about 120 mg of iron, which would ordinarily be lost in menstruation, is conserved during pregnancy. Pregnant women who have inadequate iron intake and hemoglobin concentration was reduced means that her body must increase its cardiac output to meet its oxygen needs and those of the fetus. So much extra cardiac work is physiologically fatiguing and extreme instances of severe iron deficiency, reduce hemoglobin levels can lead cardiac arrest or death from hemorrhage during delivery (7,23).

Recommended Daily dietary Allowances for healthy Thais are shown in Table1. It showed that Thais RDA are set higher for most nutrients during pregnancy.

Table 1. Recommended Daily dietary Allowances for healthy Thais

Nutrients	Non-pregnant adult (20-59 yrs)	Pregnant women
Energy (kcal)	2,000	+ 300 = 2,300
Protein (g)	44	+7 = 51
Vitamin A (RE)	600	+200 = 800
Calcium (mg)	800	+400 = 1,200
Iron (mg)	15	+30 = 45

Source: Ministry of Public Health (16).

2.3 Effect of maternal weight gain on the outcome of pregnancy

The rates of weight gained during pregnancy have been associated with adverse pregnancy outcome (24). The timing of pregnancy related variable greatly influences fetus growth. Maternal weight gain and fetal growth vary greatly throughout pregnancy. During the first trimester, the fetus mainly undergoes organogenesis, while growth is minimal. First trimester insults are therefore likely to be teratogenic, with

little effect on neonatal growth (25,26). As figure 1 shows that, the growth of the uterus and expansion of the blood supplies account for most of the weight gain during the first trimester (13 weeks) of pregnancy. The recommended weight gain over this period is approximately 1-2 kg.

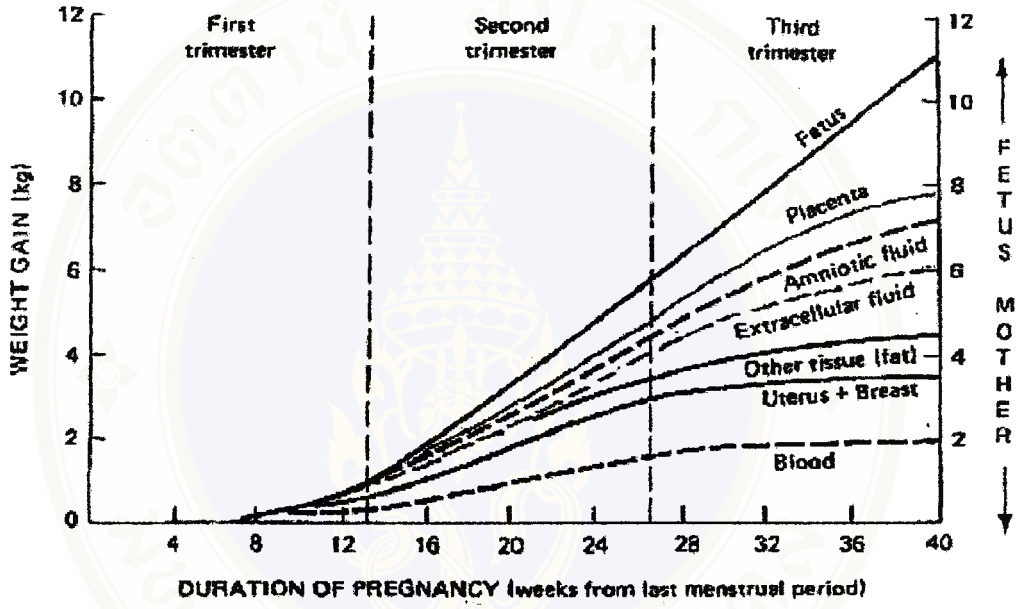


Figure 1. Components of weight gain during pregnancy

Source: Pitkin RM. Nutritional supports in obstetrics and gynecology. Clin Obstet Gynecol. 1976 (27).

Richard SS and William HD, 1999 found no consistently increased risk of intrauterine growth retardation even with mild maternal weight loss in the first trimester, because fetal size and hence energy demands are relatively small in the first trimester. First trimester fetal growth is unlikely to be dependent on adequate maternal weight gain (28).

In the second trimester, weight gain should average 0.35-0.4 kg per week. Much of it accounted for by growth of the fetus, placenta, uterus and breast. Therefore, most

likely to be influenced by maternal nutrition. Low maternal weight gain during the second trimester doubled the risk of intrauterine growth retardation even though the contribution of fetal weight to maternal weight gain during this trimester is minimal (26).

In the third trimester, the fetus quadruples its fat mass. Adequate fetal nutrition during this period also remains critical (29). Recently, several large scale epidemiological studies have shown that inadequate weight gain in the second half of pregnancy (after 20-24 weeks of gestation) is associated with the preterm birth (29,30). The same as Anna MS, 1996 results that was inadequate weight gain in the third trimester increase the risk of preterm birth by 90% (25).

Studied of maternal weight gain during pregnancy also reveal an increase risk of intrauterine growth retardation in mother with low pregnancy weigh gain (28,31,32). These results support the work by Scholl TO, et al.1990 who also demonstrated a twofold increase in low birth weight infants associated with low maternal weight gain in mid and late pregnancy (33).

There is no clear biological mechanism to support a causal role of poor gestational weight gain, but weight gain may be a marker of risk for preterm births and intrauterine growth retardation. Inadequate weight gain may well be a reflection of a poor dietary intake during pregnancy (34).

2.4 Influence of maternal nutrition on the outcome of pregnancy

Since pregnancy is a time in the life cycle when nutrition is of special importance, and maternal nutrition has an important influence on the course and

outcome of conception (35,36). Proper nutrition during pregnancy influences growth and development of the fetus and well being of the pregnant women (37).

That the outcome of pregnancy could be prejudiced by particular nutrient deficiencies was first demonstrated by Hale who reported experiments in 1933 showing that vitamin A deficiency around the time of mating and the very beginning of pregnancy produced piglets without eyeball (38). Since the 1930s the effects of deficiencies of other essential nutrients around the beginning of pregnancy has been studied in Europe, America and Asia. There is ample evidence from many countries that there is a good correlation between maternal nutritional deprivation and the outcome of pregnancy.

Among the many maternal and environmental factors influencing fetal growth and development, nutritional status and diet play important critical roles. One of the most common and widely prevalent nutritional factors is iron deficiency anemia. Iron deficiency anemia during pregnancy may result in premature labor, fetal distress and low birth weight (39). In addition, several current studies have suggested that anemia during pregnancy may increase the likelihood of poor outcome more immediately, increasing the risk of preterm delivery, and perinatal mortality (40,41).

Several studies have reported lower maternal serum vitamin A levels influencing low birth weight or premature babies (42,43). Not only that, the results of Snowman MK and Metcoff J, et al., 1981 showed that the birth weight is related to maternal nutrition (44,45). While the results from the population survey of Tawfeek HI, 1999 showed that the pregnant women who delivered small for gestational age infants had lower dietary intake than those women who delivered full-term infants (46). The

studied of Bolzan A, 1999 showed that the risk to have an Intrauterine growth retardation is significantly related to nutritional status of pregnancies (47).

2.5 Nutrition problem of Thai pregnant women

The food intake of Thai pregnant women affected by deep-rooted believe, custom and lack of knowledge regarding the nutritive value of locally available foods. Besides those are the wide variations within socially and geographically defined groups as well as a preferential allocation of food within the family.

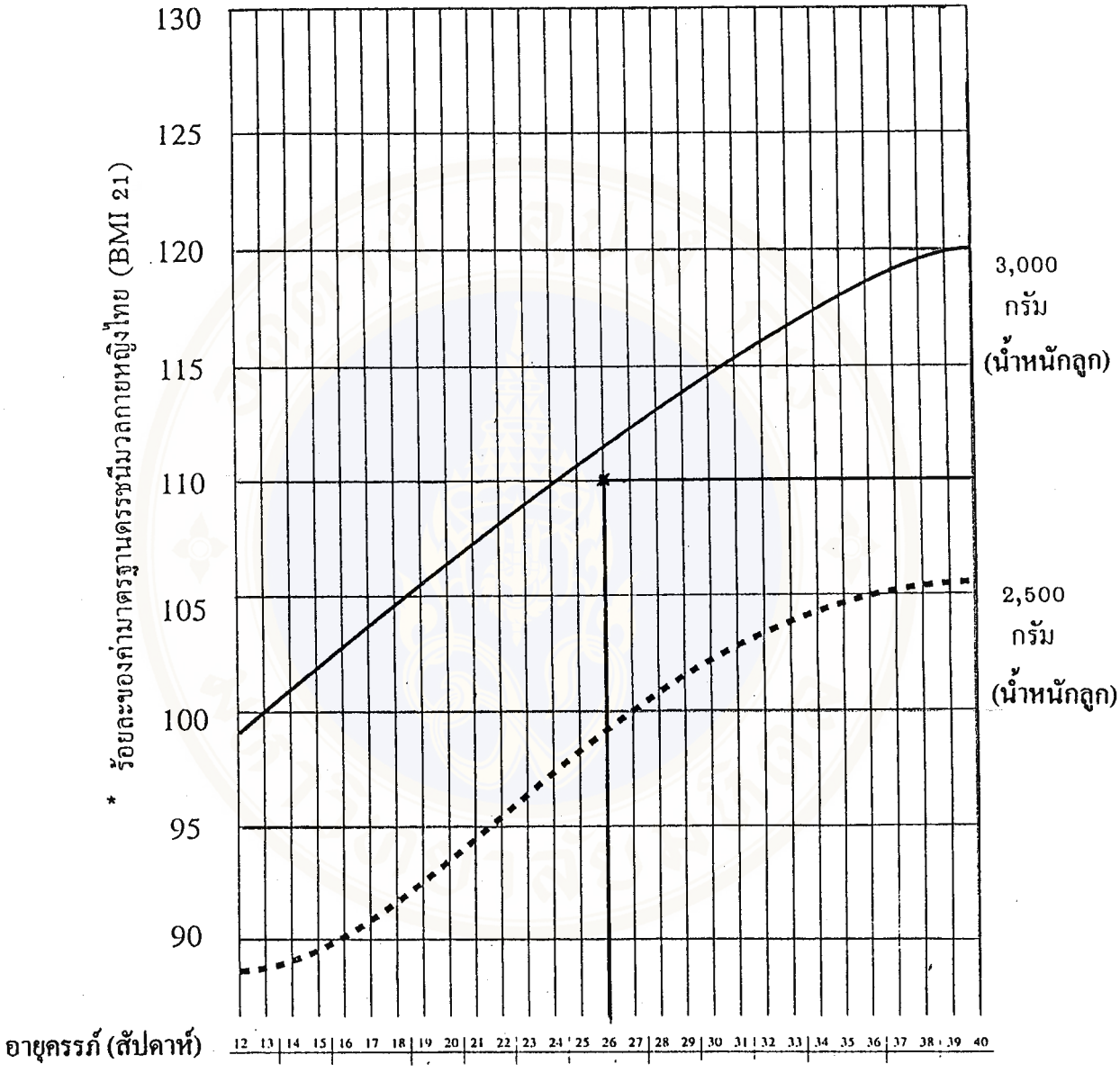
The mothers in rural poor areas have been found chronically undernourished prior to pregnancy. Many of them are pregnant at young age, while their own growth still continue. During pregnancy, their nutritional status is not improved and is even worse due to false food beliefs and taboos.

Dietary survey of pregnant women in the Northeast region revealed that their daily energy intakes averaged 2,000 kcal, which were approximately 80% of daily energy requirement. Protein intakes were rather low, as only 60-89% of the daily protein requirements was consumed (48). In 1982, the similar result still occurred. The studied on dietary intakes per day of pregnant women in Bangkok and Bang-Pa-In were 2,000 kcal, 72 g protein and 1,500 kcal, 50 g protein respectively (6). It was obvious that both protein and energy intakes of the pregnant women studied were inadequate. Same as the results of Viriyapanich T, et al. in 1984, it showed that Thai pregnant women still have an inadequate energy intake and low fat intake in the same time (49). Among the studies of anemia in pregnant women, 30-50% of this population has been found anemia (50,51). Inadequate of iron intake was found in Thai pregnant women, the average iron intake was only 49-55% of the recommended

dietary allowance (52). From the studied of the Sirivarasry J, 1995 showed that all pregnant volunteers had lower average calcium intakes than the recommended (850.94 ± 192.46 Vs 1,200 mg/d) and prevalence of leg cramps in these pregnant was 26.8% (53). So, not only protein and energy but also another nutrients especially iron and calcium that should be concerned. Furthermore, the studied of Saowakontha S, et al, 1992 showed that 52.3% of the women in the villages in Northeast of Thailand had insufficient maternal weight gain below 7 kg and 15.8% of the babies delivered by the villages women had low birth weight (54).

In 1989 and 1991, low birth weight prevalence rates were 9.5% and 9.0%, respectively for the entire country. The 1995 low birth weight rates has been reported as being 8.57 overall, Regionally the rates are 8.4 in Central Thailand, 8.18 in the Northeast, 8.04 in the South and 7.47 in Northern Thailand. To alleviate the low birth weight problem, Thailand introduced the Vallop curve, which measures maternal weight gain during pregnancy for comparison against a standard weight gain. For underweight women, they are then given a Vallop menu that recommends ways to improve their food habits (55).

กราฟโภชนาการหญิงมีครรภ์ (Vallop curve)



$$* \text{ร้อยละค่ามาตรฐานดรรชนีมวลกาย} = \frac{\text{น้ำหนัก (กิโลกรัม)} \times 100}{\text{ส่วนสูง}^2 \text{ (เมตร)} \quad 21}$$

ต.ย. เช่น อายุครรภ์ 26 สัปดาห์ น้ำหนัก 52 กิโลกรัม สูง 150 เซนติเมตร

$$\text{ร้อยละค่ามาตรฐานดรรชนีมวลกาย} = \frac{52 \times 100}{1.5^2 \quad 21} = 110.05$$

Figure 2. Vallop curve

Source: Ministry of Public Health 2000 (56).

2.6 Effect of maternal dietary supplementation

The effect of improving maternal nutrition during pregnancy on growth of the child has not been assessed, since previous studies supplemented the diets of children as well as mothers. Christiansen J, et al., 1979 clearly show that food supplementation of pregnant women at risk of malnutrition had an effect on the neonate's ability to response to and process visual information (57).

Mora JO, et al., 1979 studied on the randomized trial design in 522 pregnant women during the third trimester with 155 kcal, 20 g protein per day, the result indicated that supplementation had a significant effect on the mean birth weight and maternal weight gain (58).

Rush D, et al., 1980 had studied the effects of dietary supplementation in 748 pregnant women with a liquid diet providing 470 kcal, 40 g protein and 322 kcal, 6 g protein per day. It was shown that the group with high energy and protein supplements had increase fetal birth weight than that of the control. But significantly lower than the low protein supplemented group because of the intolerance to the food (59). Similar to the results of Winkvist A, et al. in 1998 which indicated that a nutritional supplement provided to the mother benefit her infant if the mother is malnourished (60).

Khamsimek M. et al., 1988 had studied the effects of integrating supplementary feeding for pregnant women in 160 pregnant women during the third trimester in Roi-et province with 100 g/d supplementary food. The result indicated that supplementation had a significant effect on the mean birth weight and maternal weight gain (61).

In a controlled randomized trial in Madura, East Java, pregnant women received a high (HE) or low (LE) energy supplement that provided 1,950 kJ (465 kcal) or 218 kJ (52 kcal), respectively, in the last trimester of pregnancy. The effect of this intervention on the children's growth was assessed longitudinally for the first 5 years of life. HE children were significantly heavier than LE children($p<0.05$). HE children were also taller throughout the first 5 years. Weight for height by age was similar in both groups, but stunting (height-for-age) was less prevalent in HE children. It shows that, energy supplementation of women for the last 90 days of pregnancy was effective in the promotion of postnatal growth and reduction in malnutrition of preschool children (62).

Supplements of several other essential nutrients have been associated with improved pregnancy outcome. For example, the results of Christian P, et al., 1998 indicate that vitamin A supplementation may reduce the risk for night blindness of pregnant women in Nepal (63). Similar to vitamin A supplementation, calcium supplementation has also been associated with a reduce incidence of hypertensive disorders and leg cramps of pregnant women (64,65).

2.7 Food supplementation and food guideline for Thai pregnant women

There are least reports, which studied about food supplementation for Thai pregnant women. Tontisirin K, 1986 (66) studied with 6 formula supplementary foods for pregnant women. The results showed that among malnourished mothers supplementation of protein and energy about 13 g and 350 kcal/d during the last

trimester had significant effects on maternal weight gain, birth weight of the newborn and placental weight which was comparable with Chiengtong J.'s study in 1984 (67).

For food guideline, there are many reports and books that suggested food for Thai pregnant women. Most of these suggested to consume foods based on food-based dietary guidelines in term of amount of foods per day (56,68-72). Otherwise, the Ministry of Public Health developed the menus for Thai pregnant women (73).

2.8 Sensory acceptability test of food product (74-76)

Acceptance testing is used to determine if panelists like a product, if they prefer one product to another, and/or if they intend to use a product (acceptance). These types of evaluation may appear to be identical. However, it is possible for a judge to show a strong preference for a sample, but not used it or accept if for reasons other than its like ability. Acceptance tests maybe called affective, preference, or consumer tests. Large panels (50-100) are used in this type of sensory evaluation and are often called consumer panels because untrained, inexperienced judges are used.

Several types of tests may be used to answer the question posed in this type of testing. The most commonly used evaluation technique for measuring acceptability and/or preference is the hedonic scale. The word hedonic is defined as "pertaining to, or consisting in, pleasure." Hedonic scale may have five to nine points. In addition to determining the acceptability of a single product, differences in responses to foods can be determined with the hedonic scale.

Although verbal hedonic scales like the one just described have been used frequently, but misinterpretations of the term "dislike moderately" often occurred. A modification of the hedonic scale was introduced to minimize misinterpretations of terms. The modification, the facial hedonic scale, is useful with young children and others with limited reading ability. If consists of five, or nine faces depicting varying degrees of pleasure or displeasure. One example of a facial hedonic scale is shown in Figure 2.

Figure 3. Facial hedonic scale.

Source: Carr MC. Sensory evaluation techniques. 3rd ed. New York: CRC Press; 1990. (75)

2.8.1 Home use tests

The test location or test site has numerous effects in the results, not only because of the geographic location, but also because the place in which the test is conducted defines several other aspects of the way the product is samples and perceived.

In most case, home use tests represent the ultimate in consumer tests. The product is tested under its normal conditions of use. The participants are selected to represent the target population. The entire family's opinion is obtained, and the influence of one

family member on another is taken into account. In addition to the product itself the home use test provides a check on the package to be used and the product preparation instructions, if applicable.

The advantages of home use tests are:

1. The product is prepared and consumes under natural conditions of use.
2. Information regarding preference between products will be bases on stabilized (from repeat use) rather than first impression alone as in a mall intercept test.
3. Cumulative effect on the respondent from repeated use can provide information about the potentials for repeat sale.
4. Statistical sampling plans can be fully utilized.
5. Because more time is available for the completion of the score sheet, more information can be collected regarding the consumer's attitudes toward various characteristics of the product, including sensory attributes, packaging, price, etc.

The disadvantages of the home use tests are:

1. A home use test is time consuming, take a long time to complete.
2. It uses a much smaller set of respondents than a central location test; to reach many residences would be unnecessarily lengthy and expensive.
3. The possibility of non-response is greater; unless frequently reminded, respondents forget their tasks; haphazard responses may be given as the rest draws to a close.
4. A maximum of three samples can be compared; any larger number will upset the natural use situation, which was the reason for choosing a home use test in the first

place. Thus multisample tests, such as optimization and category review, do not lend themselves to home use tests.

5. The tolerance of the product for mistakes in preparation is tested. The resulting variability in preparation along with variability from the time of use, and from other foods or products used with the test product, combine to produce a large variability across a relatively sample of subjects.

2.8.2 Balanced incomplete block designs (BIB)

The BIB design was introduced by Yates (1936) in agricultural experimentation. A basic problem in agricultural experimentation is the heterogeneity of plots (blocks), particularly when they are large in size. By having plots that are small in size, it may be possible to achieve homogeneity within plots and estimate the treatment differences with increased precision. To estimate all the treatments differences with equal precision, the arrangement of treatments within blocks should be "balance."

This design allow sensory analysts to obtain consistent, reliable data from their panelists even when the total number of samples in the study is greater than the number that can be evaluated before sensory fatigue sets in. In BIB designs the panelists evaluate only a portion of the total number of samples (notationally, each panelist evaluates k of the total of t samples, $k < t$). The specific set of k samples that a panelist evaluates is selected so that in a single repetition of a BIB design every sample is evaluated an equal number of times (denoted by r), and all pairs of samples are evaluated together an equal number of times (denoted by λ). The fact that r and λ are constant for all the samples in a BIB design ensures that each sample mean is estimated with equal precision and that all pair-wise comparisons between two sample

means are equally sensitive. The number of blocks required to complete a single repetition of a BIB design is donated by *b*.

In order to obtain a sufficiently large number of total replications, the entire BIB design (*b* blocks) may have to be repeated several times. The number of repeats or repetitions of the fundamental design is denoted by *p*. The total number of blocks is then *pb*, yielding a total of *pr* replications for every sample, and a total of $p\lambda$ for the number of times every pair of samples occurs in the total BIB design.

There are two general approaches for administering a BIB design in a sensory study. First, if the number of blocks is relatively small (three or four, for example) it may be possible to have a small number of panelists (*p* in all) return several times until each panelist has completed an entire repetition of the design. (The order of presentation of the blocks should be randomized separately for each panelist, as should be the order of presentation of the samples within each block). Second, for large values of *b*, the normal practice is to call upon a large number of panelists (*pb* in all) and to have each evaluate the samples in a single block. The block of samples that a particular panelist receives should be assigned at random. The order of presentation of the samples within each block should again be randomized in all cases.

Although the experimental designs, such as completely randomized (CR) and the randomized complete block designs (RCB), place no restriction on the number of replications per treatment, the BIB design must satisfy the restrictions.

$$\lambda\,(t\text{-}1) = r\,(k\text{-}1),\ tr = kb = N.$$

Note that *N* is the total number of observations in the experiment and that *t*, *k*, *r*, *b* and λ are all integer. The restrictions are that, for a given *t* and *k*, the required *r* and *b* are fixed by the design instead of being specified by the researcher. This is an important

consideration for researchers to be aware of in using this case of design. If t and k are given, the possible choices of r, b and λ are

$$b = \frac{t!}{k!\,(t-k)!}$$

$$r = \frac{(t-1)!}{(k-1)!(t-k)!}$$

$$\lambda = \frac{(t-2)!}{(k-1)!(t-k)!} = \frac{r(k-1)}{t-1}$$

CHAPTER III

METHODOLOGY

3.1 Study area

Ubonratchathani province was purposively selected as the model of this study since it was recognized for the nutrition problem of the pregnant women and located field station of the Institute of Nutrition, Mahidol University. Nayear, Khong Chiam and Trakarnphutphon districts were selected to represent the rural community, while Muang and Warinchamrap districts represented the urban community. The mentioned areas were used in different studies as follow.

3.1.1 Survey on demographic and nutritional status used Nareung subdistrict of Nayear, Houi-yang subdistrict of Khong Chiam and Lhai-tung subdistrict of Trakarnphutphon to represent the rural community, while communities around Muang and Warinchamrap districts represented the urban community.

3.1.2 Survey on available food source used Nadee subdistrict of Nayear and Trakarn subdistrict of Trakarnphutphon to represent the rural community, while communities around Muang and Warinchamrap districts represented the urban community.

3.1.3 Sensory acceptability and practicality tests used Nadee subdistrict of Nayear and Houi-yang subdistrict of Khong Chiam were selected to represent the rural

community, while communities around Muang and Warinchamrap districts represented the urban community.

3.2 Survey on demographics and nutrient intake per day of pregnant women

Prior to menu development and formulation, the information on demographics and nutritional status of the target population must be obtained.

In this study, the data on food frequency and 24 hrs recall of the target population which had been surveyed by Viriyapanich T. et al, 1999 (unpublished data) were used (77).

3.3 Survey on available food source, cooking method and eating habit

The purposes of this survey aimed to identify

(1) The nutrition and affordable food sources and dishes locally available.

(2) The cooking methods that normally performed and

(3) Other relevant eating habits.

The questionnaire as shown in Appendix B was used to perform the survey in the study areas.

3.4 Menu development, modification and formulation

3.4.1 Setting nutrition goal

Based on the surveyed information from section 3.2, the ideal nutritive values for the formulated menus were established in order to fulfill the potentially inadequate nutrients.

The levels mentioned in the Recommended Daily Allowances for Healthy Thais (Thai RDA) were used as standard value. The formulated menus should be able to fulfill at least 70% of the recommended value, except for iron, which had been set for only 15 mg instead of 45 mg. Normally, pregnant women received iron pill which provided 60 mg Fe everyday from the hospital.

3.4.2 Menu selection

Five recipes for each study area (rural and urban of Ubonratchathani) were primarily based on the results from the survey from section 3.3. The ingredients of each menu were adapted from the report by Tutsanasuwun and Kitboonchu, 1993 (78). Each recipe was usually cooked by using fresh locally available food products and traditional cooking methods of the target population.

3.4.3 Menu formulation

All selected recipes were modified in order to obtain the desirable nutritive value. Each developed recipe was evaluated for the nutritive value by using INMUCAL

computer software developed by the Biostatistics and Computer division of the Institute of Nutrition, Mahidol University (79).

The amounts of certain ingredients might be adjusted in order to obtain more acceptable sensory qualification.

3.5 Development of food menu guideline prototype

The prototype of guidelines for food preparation was prepared based on the information from the survey. The guideline consisted of ingredients of each menu, nutritive value per menu, illustration of cooking method, and simple descriptive as shown in Appendix C. It was made separately for rural and urban groups.

3.6 Sensory acceptability and practicality tests

3.6.1 Questionnaire preparation

Questionnaires for testing sensory acceptability and practicality of the menu was primarily developed and pretested with subjects who lived in Salaya subdistrict community. The questionnaire was then adjusted based on the pretest result before implementation (as shown in Appendix D).

3.6.2 Study design and data collection

The principle of home-use acceptability test had been applied in this study.

The design was based on the number of pregnant women available in the study areas, which was about 50 (49 and 52 pregnant women for urban and rural area, respectively). Totally 3 menus were tested, however each pregnant women tested only 2 menus. The Balanced Incomplete Block (BIB) design was used in the experimental design, where treatment number is 3 and number of experiment unit per block is 2. From calculation, BIB design needed 3 blocks (subjects) and each sample was tested by 2 subjects. Therefore, this set of design was repeated for about 15 times (45 subjects) and each menu was tested by 30 subjects.

Each time, pregnant women received 1 set of item for 1 menu in a cloth bag containing food guideline prototype, ingredients and questionnaire. Ingredients were provided in icebox for subject who did not have refrigerator at home. The subjects also received a bottle of vegetable oil as token of appreciation.

Subjects were asked to cook at home by following the provided guideline and answer the questionnaire after the consumption. In the next day, subject came to meet the research staff, returned the questionnaire and got the new set of another menu. Here, subject was also interviewed to recheck of the unclear answer in the questionnaire.

3.6.3 Data analysis

The collected data were analyzed be using SPSSWIN program. The results were shown as frequency and percentage.

3.7 Development of food menu guideline for pregnant women

From the results of the studies on sensory acceptability and practicality, the developed guideline were adjusted for their appropriation.

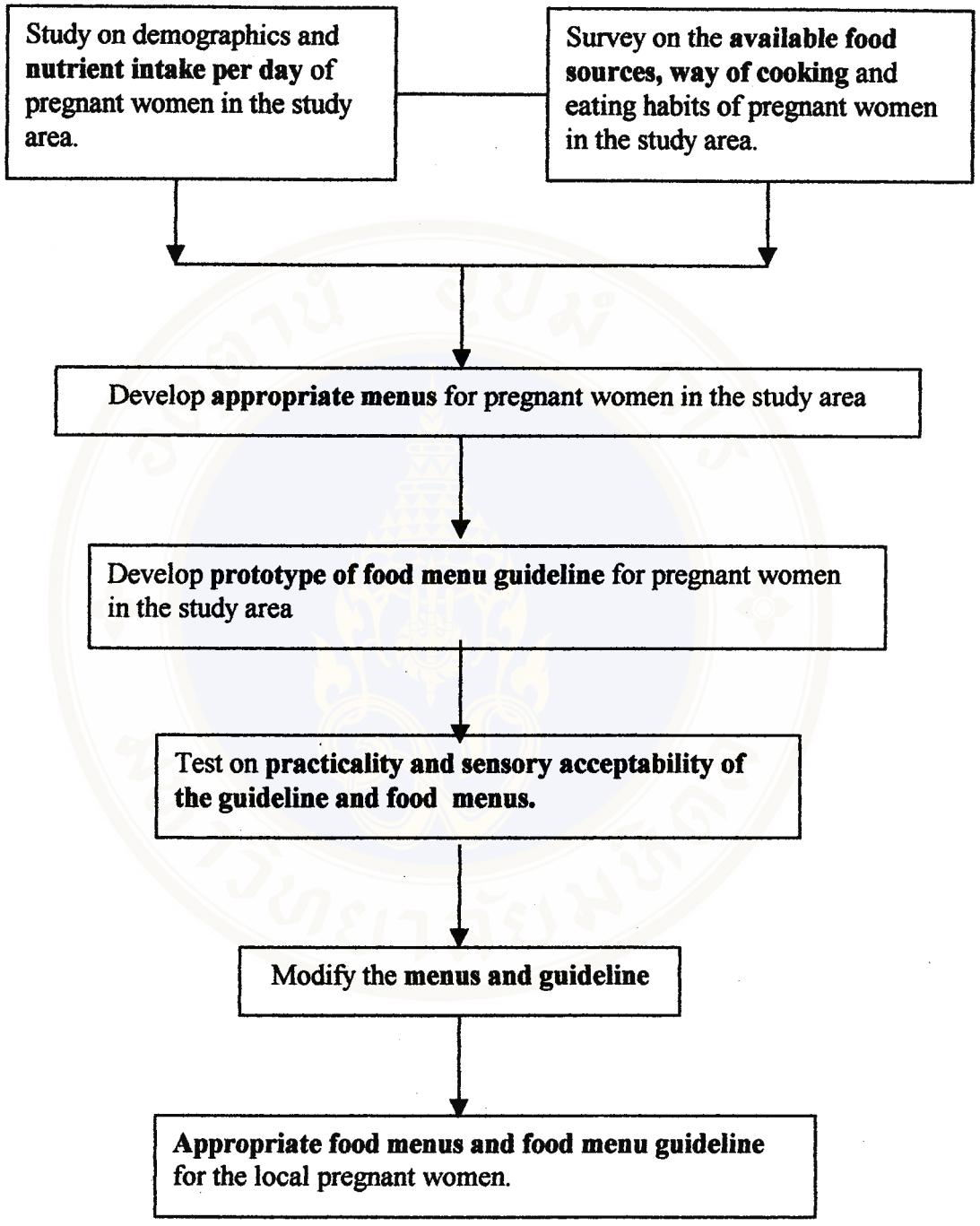


Figure 4. Flow chart of methodology.

CHAPTER IV

RESULTS

4.1 Demographics and nutrient intakes per day of pregnant women

4.1.1 Household demographics and socio-economic status

The total number of pregnant women divided to urban and rural area were 131 and 132 personnel, respectively. The Household demographic and socio-economic status was shown in Table 2. Most of pregnant women in urban attained higher than secondary education level (40.4%), while most of pregnant women in rural area attained primary education level (86.4%). The occupation of pregnant women in urban area was housewife (34.6%). But for rural area the occupation was farming (78.0%).

Household income (in cash) in urban area was 5,001-10,000 baht/month (35.9%) and 1,001-3,000 baht/month in rural area (42.4%).

Table 2. Socio-economic status of the studied pregnant women in the urban and rural areas

Description	Urban (n=131)[1]	Rural (n=132)[1]
Education of pregnant women		
- No education	-	1.5
- Primary	26.7	86.4
- Secondary	32.8	10.6
- Higher than secondary	40.4	1.5
Main occupation of pregnant women		
- House wife	34.6	14.4
- Wage earner	27.7	4.5
- Farming	0.8	78.0
- Government officer	22.3	0.8
- Own business	14.6	2.3
Household monthly income		
- Less than 1,000 baht	3.1	38.6
- 1,001-3,000 baht	9.2	42.4
- 3,001-5,000 baht	19.8	9.8
- 5,001-10,000 baht	35.9	6.1
- 10,001-30,000 baht	25.2	3.0
- 30,001-50,000 baht	5.3	-
- More than 50,000 baht	1.5	-

[1] as percentage

Source: Viriyapanich T, et al. (unpublished data)

4.1.2 Nutrition status of pregnant women

From secondary data of Viriyapanich T, et al. (unpublished data) shows that the average age of pregnant women in urban and rural area were 26.5 ± 5.6 and 25.7 ± 4.5 years, respectively. The average weeks of gestation of pregnant women in urban and

rural area were 26.5 ± 8 and 26.8 ± 7.1 weeks, respectively. Most of pregnant women both urban and rural area were healthy. The data was shown in Table 3.

Table 3. Nutritional status of pregnant women in the study areas (Mean ± SD)

Description	Urban area (n = 131)	Rural area (n = 132)
Weight (kg)	58.1 ± 9.2	53.8 ± 7.8
Height (cm)	154.9 ± 5.3	151.9 ± 5.4
Age (years)	26.5 ± 5.6	25.7 ± 4.5
Week of gestation (weeks)	26.5 ± 8.0	26.8 ± 7.1
Health status (%)		
- healthy	90.8	76.5
- weakly	9.2	23.5

Source: Viriyapanich T, et al. (unpublished data)

4.1.3 Nutrient intakes of pregnant women for 1 day

The data of nutrient intakes per day of Ubonratchathani urban and rural pregnant women are shown in Table 4 and calculated as percent RDA.

Table 4. Nutrient intake per day of pregnant women in the studied areas

Nutrient	RDA.	Urban (n = 129)		Rural (n = 131)	
		Median	%RDA	Median	%RDA
Energy(kcal)	2,300	1991.0	86.6	1968	85.6
Protein (g)	51	71.5	140.0	62.7	123.0
Fat (g)	75	54.2	72.2	18.5	24.7
CHO (g)	345	297.0	86.1	389.0	112.7
Calcium(mg)	1,200	478.1	39.8	222.0	18.5
Iron (mg)	45	15.1	33.6	13.3	29.6
Vit. A (RE)	800	426.7	53.3	198.7	24.8
Vit. C (mg)	80	58.1	73.0	35.9	45.0

Source: Viriyapanich T, et al. (unpublished data)

Ratio of energy distribution from protein: fat: carbohydrate in the diet consumed by pregnant women in urban area was suitable but pregnant women in rural area was not. They had very low fat and high carbohydrate as shown in Table 5.

Table 5. Energy distribution of protein, fat and carbohydrate in the diet consumed by pregnant women on 1 day in the studied areas

Study area	Energy distribution (%)		
	Protein	Fat	carbohydrate
Urban area	14.6	24.9	60.5
Rural area	12.7	8.4	78.8
Ideal proportion	10-15	20-30	60-65

Source: Viriyapanich T, et al. (unpublished data)

4.2 Available food source, cooking method and eating habits

4.2.1 Available food source

Urban area:

There are many markets and supermarkets in urban area as do in Bangkok. So, the kind and price of these foods look like foods from Bangkok. Food availability and varieties are much better than rural area.

The example of foods in urban area was shown in Table 6. These foods are divided according to food categories and their serving size, cost per serving and nutrient content/serving size.

Table 6. Serving size, cost and nutrient content per serving of foods availability in urban area

Food commodity	Serving size (g)	Cost per serving (baht)	Nutrient content/serving size					
			Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vitamin A (RE)
Legumes, nuts and seeds (and products)								
1. Mungbean noodle	21	3.0	70.5	0.35	0.03	7.4	0.9	-
2. Tofu	95	5.0	128.3	11.9	7.7	**178.6**	5.3	3.8
Vegetables								
1. Amaranth spineless	55	0.4	23.7	-	0.4	**187.6**	2.3	**285.4**
2. Swamp cabbage	23	0.2	4.8	0.3	0.1	9.4	0.8	**46.9**
3. Carrot	29	2.0	16.0	0.4	0.1	17.4	0.5	**537.1**
4. Pumpkin	29	0.5	12.5	0.6	0.1	2.5	0.2	**65.3**

Table 6. Serving size, cost and nutrient content per serving of foods availability in urban area (cont.)

Food commodity	Serving size (g)	Cost per serving (baht)	Nutrient content/serving size					
			Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vitamin A (RE)
Meat and meat product								
1. Pork-liver	13	1.2	15.2	2.6	0.4	1.4	1.4	**677.7**
2. Pork-organ	58	5.0	63.2	8.6	2.7	7.0	**6.7**	**310.9**
3. Chicken-liver	13	1.0	18.7	2.3	0.9	1.3	0.6	**1472.3**
4. Chicken-blood	40	1.0	35.2	8.0	0	4.4	**9.6**	-
Finfish and shellfish								
1. Salted mullet	35	0.5	69.3	14.1	1.3	43.8	2.7	-
2. Steamed mackerel	34	3.0	46.2	8.5	1.4	55.4	1.0	-
3. Fried mimrow	35	3.5	96.3	15.5	3.8	83.6	0.3	5.3
4. Dried sheat fish	39	15.6	30.8	6.7	0.4	19.1	0.4	-
5. Dried shrimp	12	3.0	30.6	5.6	0.3	**276.6**	2.4	-

Table 6. Serving size, cost and nutrient content per serving of foods availability in urban area (cont.)

Food commodity	Serving size (g)	Cost per serving (baht)	Nutrient content/serving size					
			Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vitamin A (RE)
6. Squid	41	5.0	27.5	6.2	0.3	2.1	1.2	-
7. Canned sardine in tomato sauce	50	4.5	74.5	11.1	2.7	**165.0**	2.3	-
8. Tongue clam	30	0.5	30.6	3.7	1.0	14.7	2.4	-
9. Cooked ark shell	26	2.0	17.7	2.7	0.1	21.3	2.9	-
Others[1]								
1. Mhee kati	290	5.0	**672.8**	10.4	**34.5**	49.3	5.2	40.6
2. Pla-tong-ko	18	1.0	76.7	1.4	4.3	-	-	-
3. Khai-hong	62	2.0	205.8	3.7	9.3	24.8	1.2	16.7

[1] others: - Mhee kati is cooked rice vermicelli mixed with coconut milk, tofu, etc.

- Pla-tong-ko is deep-fried wheat flour dough

- Khai-hong is deep-fried glutinous flour ball with ground dehulled mungbean and sugar

Bold numbers show the significant amounts of nutrients in those food commodities.

Rural area:

Most of foods came from purchasing. There were weekly markets available for people only in the morning. The grocery store has some kinds of foods such as dried food, fresh food, and local food. However there were mobile vendors who went to villages on daily basis. Not only that, people can find some foods from their own backyard garden. Some food were given from the neighbors. Results from food availability surveys were shown in Table 7.

Table 7. Serving size, cost and nutrient content per serving of foods availability in rural area

Food commodity	Serving size (g)	Cost per serving (baht)	Nutrient content/serving size					
			Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vitamin A (RE)
Legumes, nuts and seeds (and products)								
1. Mungbean noodle	21	2.5	70.5	0.35	0.03	7.4	0.9	-
2. Black sesame seed	9	1.0	49.8	2.0	4.2	**99**	1.4	0.4
3. Peanut	20	0.7	106	5.9	7.7	10	2.1	0.6
4. Mungbean	22	0.7	72.4	5.1	2.3	27.5	1.1	1.8
Vegetables								
1. Amaranth spineless	55	0.4	23.7	-	0.4	**187.6**	2.3	**285.4**
2. Swamp cabbage	23	(home grown)	4.8	0.3	0.1	9.4	0.8	**46.9**

Table 7. Serving size, cost and nutrient content per serving of foods availability in rural area (cont.)

Food commodity	Serving size (g)	Cost per serving (baht)	Nutrient content/serving size					
			Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vitamin A (RE)
3. Pumpkin	29	0.4	12.5	0.6	0.1	2.5	0.2	**65.3**
4. Ivy gourd	53	(home grown)	18.6	1.7	0.2	66.8	2.4	**327.4**
5. Mint leave	10	(home grown)	4.7	0.4	0.1	4.0	0.5	53.8
6. Basil leave	10	(home grown)	4.4	0.3	0.1	16.5	0.3	45.2
7. Holy leave	10	(home grown)	3.0	0.3	0.1	14.0	0.2	59.1
<u>Meat and meat products</u>								
1. Chicken, eggs	50	1.5	80.0	6.2	5.9	63.0	0.8	**100.0**
2. Grilled chicken-spererib	60	4.0	**156.6**	12.9	8.9	**344.8**	1.2	22.6
3. Chicken blood	40	1.0	35.2	8.0	0.0	4.4	**9.6**	-
4. Chicken liver	13	2.9	18.7	2.3	0.9	1.3	0.6	**1472.3**

Table 7. Serving size, cost and nutrient content per serving of foods availability in rural area (cont.)

Food commodity	Serving size (g)	Cost per serving (baht)	Nutrient content/serving size					
			Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vitamin A (RE)
5. Pork	40	3.2	61.6	12.6	3.1	1.2	0.2	-
6. Pork liver	13	1.2	15.2	2.6	0.4	1.4	1.4	**677.7**
7. Steamed pork sausage (Moo-yor)	60	4.0	**158.4**	9.5	**13.4**	4.2	1.1	-
8. Pork organ soup	130	10.0	56.0	5.0	3.6	17.3	5.8	10.7
9. Beef	40	4.0	60.0	8.0	2.9	3.6	1.2	6.4
10. Beef organ	58	5.2	54.5	8.1	1.9	16.2	2.9	**515.0**
11. Cooked meat ball	35	3.0	29.4	5.8	0.2	7.4	1.8	-
12. Tadpole	40	8.0	38.0	8.4	0.2	18.4	0.7	-
13. Frog-meat	35	7.0	33.3	7.3	0.2	16.1	0.6	-

Table 7. Serving size, cost and nutrient content per serving of foods availability in rural area (cont.)

Food commodity	Serving size (g)	Cost per serving (baht)	Nutrient content/serving size					
			Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vitamin A (RE)
Finfishes and shell fishes								
1. Steamed mackerel	34	3.0	46.2	8.5	8.5	55.4	1.0	-
2. Fried mimrow	35	4.0	96.3	15.5	3.8	83.6	0.3	5.3
3. Dried lazzard fish	34	5.0	31.6	6.6	6.6	14.3	0.2	1.7
4. Catfish	35	2.1	34.3	6.4	0.8	11.9	0.1	30.0
5. Canned sardine in tomato sauce	50	4.5	74.5	11.1	2.7	**165.0**	2.3	-
6. Dried small fish	15	0.5	50.2	8.8	1.4	**255.0**	0.4	-
7. Squid	41	3.1	27.5	6.2	0.3	2.1	1.2	-
8. Shrimp	32	5.1	26.2	5.2	0.4	51.5	0.7	-
9. Dried shrimp	12	3.0	30.6	5.6	0.3	**276.6**	2.4	-
10. Tongue clam	30	0.5	30.6	3.7	0.1	14.7	2.4	-
11. Pond snail	27	1.4	19.7	3.3	1.2	0.3	**6.8**	59

Table 7. Serving size, cost and nutrient content per serving of foods availability in rural area (cont.)

Food commodity	Serving size (g)	Cost per serving (baht)	Nutrient content/serving size					
			Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vitamin A (RE)
Fruits								
1. Mango (ripe)	138	2.9	85.6	0.8	0.4	13.8	0.4	**372.1**
2. Papaya (ripe)	140	1.7	71.4	1.1	0.4	13.5	0.4	**243.4**
Others[1]								
1. Mhee kati	290	5.0	**672.8**	10.4	**34.5**	49.3	5.2	40.6
2. Khai-hong	62	2.0	205.8	3.7	9.3	24.8	1.2	16.7

[1] others: - Mhee kati is cooked rice vermicelli mixed with coconut milk, tofu, etc.

- Khai-hong is deep-fried glutinous flour ball with ground de-hulled mungbean and sugar

Bold numbers show the significant amounts of nutrients in those food commodities.

4.2.2 Cooking method

From observation, least of food in rural area cooks with oil or coconut milk. Since eating habits and their thought that fat and oil have bad smell and reduce appetite. The cooking methods that were usually performed in rural included boiling, steaming, grilling, while frying were other additional cooking methods for subjects in the urban areas.

4.2.3 Eating habits

In the rural area of Ubonratchathani Province, the typical meal consists of cooked glutinous rice consumed with "jeaw", vegetables and small amounts of fishes. Beside these, "som-tum" is the popular dish for people in this area too.

The jeaw, which is almost the regular dish for many rural Northeast Thais, is usually a mixture of fermented fish, chilies and condiments and consume with vegetables. Sometime if they could not find or have no money to buy any foods, they only consummed glutinous rice with jeaw.

For urban area, cooked glutinous rice is staple foods. But cooked rice still consumed by many people too. Side dishes similar to other urban area in Thailand.

Both areas, there was no special distribution of protein or other nutrient rich sources to pregnant women. However, fruit was the extra food for pregnant women in rural area. Most of pregnant women in both areas had no restricted food. Meal was prepared by pregnant women in both areas (81.6% in urban and 98.1% in rural area). The data was shown in Table 8.

Table 8. Eating habits of pregnant women in the studied area

Description	Urban (n=49)[1]	Rural (n=52)[1]
The kinds of restricted food while pregnancy.		
- None	65.3	76.9
- Pork/beef organ	12.2	3.8
- Eggs	8.2	9.6
- Durians	6.1	3.8
- Others	8.2	5.8
The kinds of extra food while pregnancy		
- None	34.7	30.8
- Fruits	18.4	32.7
- Desserts	12.2	23.1
- Beverages	20.4	3.8
- Others	14.3	9.6
Person who prepared meal at home		
- Pregnant women	81.6	98.1
- Others persons	18.4	1.9

[1] as percentage

The eating habits of pregnant women in other kinds of foods were as follow

4.2.3.1 Desserts

Most of pregnant women in urban area consumed desserts more than 1-3 times/week during pregnancy period (Table 9) with about half consumed desserts with coconut milk. While about 54% of pregnant women in rural consumed desserts less than 1-3 times/week. Acquisition of these desserts were purchase both areas (93.3% in urban and 70.8% in rural).

Table 9. Kind, consumption frequency and way of acquisition of desserts of pregnant women

Description	Urban (n=49)[1]	Rural (n=52)[1]
Consumed more than 1-3 times/week during pregnancy	61.2	46.2
1. The kind of desserts		
- Dessert with coconut milk	56.7	75.0
- Dessert without coconut milk	36.7	25.0
- No specific	6.6	-
2. Frequency consumption		
- Everyday	36.7	29.2
- 1-3 times/week	63.3	70.8
3. Way of acquisition		
- Purchased	93.9	70.8
- Produced	3.3	29.2
- Given	3.4	-
Consumed less than 1-3 times/week during pregnancy	38.8	53.8
Reason: - Inconvenient	-	35.7
- Not prefer	100	28.9
- No money	-	35.7

[1] as percentage

4.2.3.2 Fried foods

Most of pregnant women in urban area consumed fried foods more than 1-3 times/week during pregnancy period (Table 10). More than 70% of pregnant women in this area consumed fried meat. While about half of pregnant women in rural area consumed fried foods less than 1-3 times/week (44.2%). Acquisition of these fried foods were purchase both areas (65% in urban and 68.9% in rural).

Table 10. Kind, consumption frequency and way of acquisition of fried foods of pregnant women

Description	Urban (n=49)[1]	Rural (n=52)[1]
Consumed more than 1-3 times/week during pregnancy	81.6	55.8
1. The kind of fried food		
- Fried fruits	20.0	37.9
- Fried meat	75.0	62.1
- Others such as fried vegetable	5.0	-
2. Frequency consumption		
- Everyday	20.0	13.8
- 1-3 times/week	80.0	86.2
3. Way of acquisition		
- Purchased	65.0	68.9
- Produced	35.0	35.1
Consumed less than 1-3 times/week during pregnancy	18.4	44.2
Reason: - Inconvenient	25.0	25.0
- Not prefer	75.0	75.0

[1] as percentage

4.2.3.3 Snack foods

Table 11 shown 57-62% of pregnant women in both areas consumed snack foods less than 1-3 times/week during pregnancy period because they did not prefer to eat it.

Table 11. Kind, consumption frequency and way of acquisition of snack foods of pregnant women

Description	Urban (n=49)[1]	Rural (n=52)[1]
Consumed more than 1-3 times/week during pregnancy	38.8	42.3
1. The kind of snack food		
- Popcorn	26.3	-
- Rice crispy	21.1	45.5
- Kanom ping/kha gai/kanom khai	-	27.3
- Nut and product	-	13.6
- Potato chip	47.4	13.6
- No specific	5.2	-
2. Frequency consumption		
- Everyday	26.3	13.6
- 1-3 times/week	73.7	86.4
3. Way of acquisition		
- Purchased	100	100
- Produced	-	-
Consumed less than 1-3 times/week during pregnancy	61.2	57.7
Reason: - Inconvenient	-	13.3
- Don't hungry	16.7	16.7
- Not prefer	83.3	50.0
- No money	-	20.0

[1] as percentage

4.2.3.4 Fruits

Most of pregnant women in both urban and rural areas consumed fruits more than 1-3 times/week during pregnancy period (Table 12). Acquisition of these fruits were purchase both areas (89.4% in urban and 61.5% in rural)

Table 12. Kind, consumption frequency and way of acquisition of fruits of pregnant women

Description	Urban (n=49)[1]	Rural (n=52)[1]
Consumed more than 1-3 times/week during pregnancy	96.0	75.0
1. The kind of fruit		
- Orange	36.2	20.5
- Banana	12.8	41.0
- Mango	15.0	23.1
- Others such as grape, apple, rambutan, durian, etc.	24.0	15.4
- No specific	2.0	-
2. Frequency consumption		
- Everyday	38.3	41.0
- 1-3 times/week	61.7	59.0
3. Way of acquisition		
- Purchased	89.4	61.5
- Produced	10.6	35.9
- Given	-	2.6
Consumed less than 1-3 times/week during pregnancy	4.0	25.0
Reason: - Inconvenient	-	15.4
- Not prefer	100	30.8
- No money	-	53.8

[1] as percentage

4.2.3.5 Milk and dairy products

Table 13 shown most of pregnant women in urban area consumed milk and dairy product more than 1-3 times/week during pregnancy period. They consumed milk and dairy product everyday (65.7%) with about half consumed UHT milk. While 56% of pregnant women in rural area consume milks and dairy products less than 1-3 times/week. Acquisition of these milks were purchase both areas.

Table 13. Kind, consumption frequency and way of acquisition of milk and dairy products of pregnant women

Description	Urban (n=49)[1]	Rural (n=52)[1]
Consumed more than 1-3 times/week during pregnancy	71.4	44.2
1. The kind of milk		
- UHT milk	54.3	91.3
- Pasteurized milk	8.6	8.7
- Sterilized milk	17.1	-
- Drinking yogurt	11.4	-
- Others	8.6	-
2. Frequency consumption		
- Everyday	65.7	34.8
- 1-3 times/week	34.3	65.2
3. Way of acquisition		
- Purchased	100	100
Consumed less than 1-3 times/week during pregnancy	28.6	55.8
Reason: - Inconvenient	-	14.3
- Don't hungry	23.9	7.1
- Not prefer	61.5	32.1
- No money	14.6	46.5

[1] as percentage

4.2.3.6 Beverages

Most of pregnant women in urban area consume beverages more than 1-3 times/week during pregnancy period (Table 14). The main kinds of beverages in this area were soft drinks. In rural area, 69% of pregnant women consumed beverage less than 1-3 times/week. Acquisition of these beverages was purchase both areas.

Table 14. Kind, consumption frequency and way of acquisition of beverages of pregnant women

Description	Urban (n=49)[1]	Rural (n=52)[1]
Consumed more than 1-3 times/week during pregnancy	67.3	30.8
1. The kind of drinks		
- Soft drink	84.8	81.3
- Fruit juice	12.1	-
- Others such as coffee, cocoa	3.1	18.7
2. Frequency consumption		
- Everyday	54.5	31.3
- 1-3 times/week	45.5	68.7
3. Way of acquisition		
- Purchased	93.9	93.8
- Produced	6.1	6.2
Consumed less than 1-3 times/week during pregnancy	32.7	69.2
Reason: - Inconvenient	-	27.8
- Don't hungry	12.5	8.3
- Not prefer	75.0	22.2
- No money	12.5	41.7

[1] as percentage

4.3 Menu development

4.3.1 Nutritional goal

Consequently from Table 4, the nutrient intake that were not reach 70% RDA were listed and the missing nutrient were calculated as show in Table 15. For urban area, the nutrients that pregnant women still missing and less than 70% of the recommended daily allowance were calcium, iron and vitamin A. For rural area, pregnant women still have insufficiency nutrient intake that were fat, calcium, iron, vitamin A and vitamin C.

It should be noted that the recommendation for Fe for pregnant women is 45 mg but in this study it was set only 15 mg. Because normally pregnant women can get Fe pill about 60 mg/d from hospital.

Table 15. Information of nutrient content needed for developed menus of urban and rural areas in order to fulfill the inadequacy nutrients

Nutrient	Nutrition goal (70%RDA)	Urban area		Rural area	
		Nutrient intake*	Missing nutrient content	Nutrient intake*	Missing nutrient content
Fat	64 g (25% total calories)	54.2	9.8	18.5	45.5
Calcium	840 mg	478.1	361.9	222	618
Iron	15 mg	15.1	-	13.3	1.7
Vitamin A	560 RE	426.7	133.3	198.7	361.3
Vitamin C	56 mg	58.1	-	35.9	20.1

* Source: Viriyapanich T, et al. (unpublished data)

4.3.2 Menu selection

Popular and usually dishes of each area were selected and modified. Besides, the locally available foods that easily to procure and have high nutritive value were selected in suggestion.

Urban area:

i. 5 menus were selected

1. Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)
2. Fried tofu with vegetables and pork (Tao hu shong krueng)
3. Fried rice with canned sardines in tomato sauce (Khao phud pla-kra-pong)
4. Fried rice with tofu (Khao phud tao hu)
5. Pork liver with chilies and basil leaves (Phud graproa tub moo)

ii. The suggested locally available foods

1. Small fried fishes
2. Grilled, fried, boiled or cooked pork liver/ chicken liver
3. Mhee kati (cooked rice vermicelli mixed with coconut milk, tofu, etc.)
4. Kanom tua pap (cooked glutinous flour with dehulled mungbean, coconut meat, sugar and sesame)
5. Tao suan (dehulled mungbean in cooked cassava flour and cover with coconut milk)/ Pla tong ko (deep fried wheat flour dough)
6. Khao tom phud (glutinous rice steamed with coconut milk)

Rural area:

i. 5 menus were selected

1. Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)
2. Glutinous rice cooked with dehulled mungbean and peanut (Khoa nheaw na tua)

3. Grilled catfish mixed with vegetables and condiments (Laab pla duk)
4. Chicken curry with pumpkin (Khang gai sai fuktong)
5. Chopped chicken-sparerib steamed with chilies paste (Mok se krong gai)

ii. The suggested locally available foods

1. Small fried fishes
2. Grilled, fried, boiled or cooked pork liver/ chicken liver
3. Tao suan (dehulled mungbean in cooked cassava flour and cover with coconut milk)/ Pla tong ko (deep fried wheat flour dough)
4. Grilled, fried, or cooked chicken-sparerib
5. Steamed, fried or cooked pork sausage (moo-yor)
6. Steamed pumpkin with coconut.

The nutritive value of suggested locally available foods was shown in Appendix E.

4.3.3 Menu formulation

The INMUCAL computer program was used to calculate for nutritive value. After that, each menu was modified until an appropriate recipe is obtained. The formulation of each menu was shown below.

Urban area:

1. Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)

Ingredients:

Hen egg	1 egg
Canned sardines in tomato sauce	1 piece
Ivy gourd	3 tablespoons
Basil leaves	2 tablespoons
Vegetable oil	4 tablespoons
Fish sauce	

Net weight: 115 g (for 1 meal)

Figure 5. Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)

2. Fried tofu with vegetables and pork (Tao hu shong krueng)

Ingredients:

Tofu, diced	1 piece
Chopped pork	3 tablespoons
Onion-young green	1 ladle
Carrot	2 tablespoons
Sweet pepper	2 tablespoons
Garlic, chopped	2 tablespoons
Vegetable oil	3 tablespoons

Fish sauce, sugar

Net weight: 237 g (for 1 meals)

Figure 6. Fried tofu with vegetables and pork (Tao hu shong krueng)

3. Fried rice with canned sardines in tomato sauce (Khao phud pla-kra-pong)

Ingredients:

Cooked rice	2 ladles
Canned sardines in tomato sauce	2 pieces
Pumpkin, diced	2 tablespoons
Carrot, diced	2 tablespoons
Onion, diced	2 tablespoons
Chinese kale, sliced	1 ladle
Coriander, sliced	1 stem
Garlic, chopped	2 tablespoons
Vegetable oil	3 tablespoons

Fish sauce, sugar

Net weight: 417 g (for 1 meal)

Figure 7. Fried rice with canned sardines in tomato sauce (Khao phud pla-kra-pong)

4. Fried rice with tofu (Khao phud tao hu)

Ingredients:

Cooked rice	3 ladles
Tofu, diced	½ piece
Pork liver, diced	1 tablespoon
Dried shrimp	1 tablespoons
Tomato, diced	2 tablespoons
pumpkin, diced	2 tablespoons
Onion, diced	2 tablespoons
Coriander, slice	1 stem
Garlic, chopped	2 tablespoons
Vegetable oil	3 tablespoons

Fish sauce, sugar

Net weight: 347 g (for 1 meal)

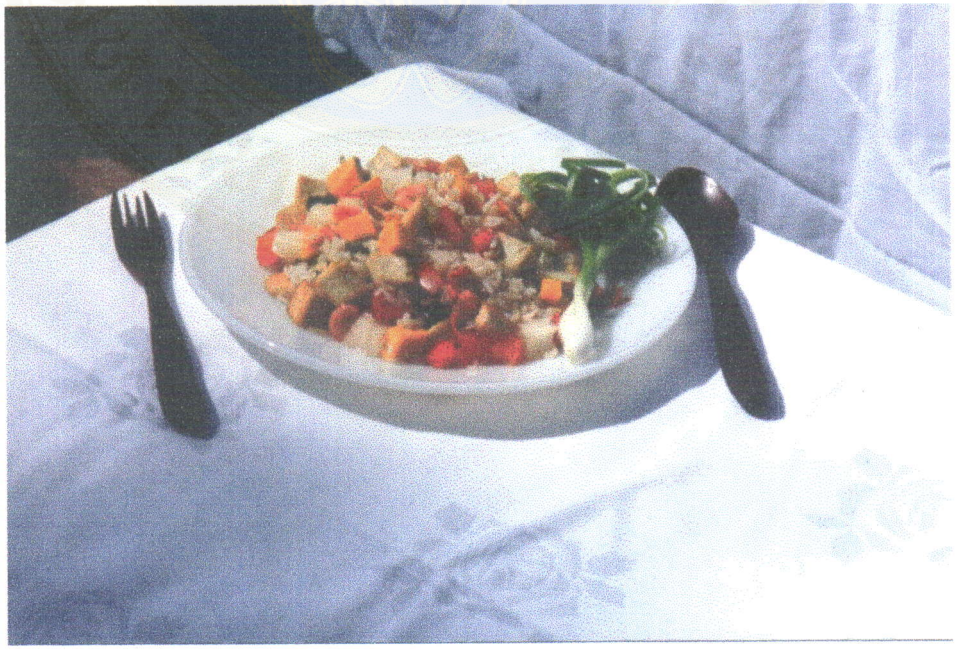


Figure 8. Fried rice with tofu (Khao phud tao hu)

5. Pork liver with chilies and basil leaves (Phud graproa tub moo)

Ingredients:

Pork liver	½ cup
Basil leaves	½ cup
Chili	5 chilies
Corn-young	2 tablespoons
Garlic, chopped	2 tablespoons
Vegetable oil	2 tablespoons
Fish sauce, sugar	

Netweight: 103 g (for 1 meal)

(This menu should eat only once a week. It provides enough for vitamin A)

Figure 9. Pork liver with chilies and basil leaves (Phud graproa tub moo)

Rural area:

1. Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)

Ingredients:

Hen egg	1 egg
Canned sardines in tomato sauce	1 piece
Ivy gourd	3 tablespoons
Basil leaves	2 tablespoons
Vegetable oil	4 tablespoons
Fish sauce	

Net weight: 115 g (for 1 meal)

Figure 10. Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)

2. Glutinous rice cooked with dehulled mungbean and peanut

(Khoa nheaw na tua)

Ingredients:

Peanut	1 tablespoons
Dehulled mungbean	1 tablespoons
Dried shrimp	1 tablespoons
Glutinous rice	5 tablespoons
Vegetable oil	1 teaspoon

Salt, sugar

Net weight: 159 g (for 1 meal)

Figure 11. Glutinous rice cooked with dehulled mungbean and peanut (Khoa nheaw na tua)

3. Grilled catfish mixed with vegetables and condiments (Laab pla duk)

Ingredients:

Catfish, grilled (medium size)	1 fish
Onion young green, thin sliced	2 tablespoons
Shallot bulbs, thin sliced	1 tablespoons
Galangal, thin sliced	1 teaspoons
Mint leaves	½ cup
Kaffer lime-leaves, thin sliced	1 tablespoons
Roasted rice	2 teaspoons
Chili powder	1 teaspoon
Black sesame seed	3 teaspoons

Fish sauce, Lemon water

Vegetables such as basil leave, swamp cabbage

Net weight: 212 g (for 1 meal)

Figure 12. Grilled catfish mixed with vegetables and condiments (Laab pla duk)

4. Chicken curry with pumpkin (Khang gai sai fuktong)

Ingredients:

Chicken	2 ladles
Amaranth spineless	1 ladle
Pumpkin	2 ladles
Holy leaves	2 tablespoons
Vegetable oil	1 tablespoons
Fish sauce, water fermented fish	

Ingredients for making a curry paste:

Lemon grass, thin sliced	1 tablespoons
Dried chili	5-6 chilies
Kaffer lime-leaves, thin sliced	3 leaves
Shallot bulbs, thin sliced	1 bulb
Salt	

Net weight: 432 g (for 2 meals)

Figure 13. Chicken curry with pumpkin (Khang gai sai fuktong)

5. Chopped chicken-sparerib steamed with chilies paste (Mok se krong gai)

Ingredients:

Bamboo shoot	3 ladles
Ya nang leaves	3 leaves
Wildbetal leaves	3 leaves
Holy leaves	½ cup
Chicken-sparerib, chopped	1 ladle
Kaffer lime-leaves	3 leaves
Fish sauce, water fermented fish	

Ingredients for making a curry paste:

Dried chili	5-6 chilies
Shallot bulbs, thin sliced	1 bulb
Kaffer lime-leaves, thin sliced	3 leaves
Wild ginger, thin sliced	1 tablespoons
Salt	

Net weight: 230 g (for 1 meal)

Figure 14. Chopped chicken-sparerib steamed with chilies paste (Mok se krong gai)

Energy and nutritive value of each developed menu was shown in Table 16.

Table 16. Energy and nutritive value for the developed menus

menu	Energy (kcal)	Protein (g)	Fat (g)	Ca (mg)	Fe (mg)	Vit.A (RE)
Urban area:						
1. Omelet with canned sardines in tomato sauce	336.5	15.1	30.0	205.9	2.9	156.9
2. Fried tofu with vegetables and pork	442.4	28.4	31.9	318.2	9.6	372.1
3. Fried rice with canned sardines in tomato sauce	502.5	20.4	21.2	310.8	5.3	388.9
4. Fried rice with tofu	645.2	23.5	24.9	387.1	8.7	935.8
5. Pork liver with chilies and basil leaves [1]	220.9	17.2	14.4	12.1	8.8	4269.9
Rural area:						
1. Omelet with canned sardines in tomato sauce	336.5	15.1	30.0	205.9	2.9	156.9
2. Glutinous rice cooked with dehulled mungbean and peanut	382.7	13.9	11.8	192.9	3.0	1.0
3. Grilled catfish mixed with vegetable and condiments	271.7	30.1	8.3	155.7	2.5	83.9
4. Chicken curry with pumpkin [2]	414.2	40.4	18.3	88.2	5.1	453.5
5. Chopped chicken-sparerib steamed with chilies paste	190.0	15.4	7.9	353.5	2.4	132.5

[1] Because vitamin A can be stored in the body, daily intake is not necessary. So, pregnant women should consumed this menu once a week.

[2] for 2 meals

4.4 Development of food menu guideline prototype

The prototype of guideline for food preparation was prepared separately for rural and urban areas. The guideline consisted of ingredients of each menu, amount of ingredients, nutritive values per menu, illustrations with explanation step by step for cooking method. It was shown in Appendix C.

4.5 Sensory acceptability and practicality tests

4.5.1 Opinion of pregnant women on the suggested locally available foods

4.5.1.1 Urban area

Results from questionnaire and interview are described below and shown in Table 17.

About half of pregnant women like Small fried fishes, Mhee kati and Kanom tua pap. While more than 65% like Grilled, fried, boiled or cooked pork liver/chicken liver. Most of pregnant women will consume these foods if being suggested and will pass the information to other pregnant women.

Table 17. Opinion of pregnant women in urban area on the suggested locally available foods

description	FU1 (%)	FU2 (%)	FU3 (%)	FU4 (%)	FU5 (%)	FU6 (%)
Likability						
- Like	59.2	77.5	51.0	50.0	77.6	66.7
- Not like	40.8	22.5	49.0	50.0	22.4	33.3
Consume if being suggested						
- Consume	81.6	91.8	70.8	62.5	93.9	85.7
- Not consume	18.4	8.2	29.2	37.5	6.1	14.3
Cause: - Inconvenient	11.1	-	14.2	11.8	33.3	16.7
- No money	-	-	-	-	-	-
- Not prefer	88.9	100	85.7	88.2	66.7	83.3
Pass the information to others pregnant women						
- Pass	88.9	97.9	82.9	87.8	93.0	90.7
- Not pass	11.1	53.1	17.1	12.2	7.0	9.3

Remarks: FU1 = Small fried fishes

FU2 = Grilled, fried, boiled or cooked pork liver/chicken liver

FU3 = Mhee kati (cooked rice vermicelli mixed with coconut milk, tofu, etc.)

FU4 = Kanom tua pap (cooked glutinous flour with dehulled mungbean, coconut meat, sugar and sesame)

FU5 = Tao suan (dehulled mungbean in cooked cassava flour and cover with coconut milk)/ Pla tong ko (deep fried wheat flour dough)

FU6 = Khao tom phud (glutinous rice steamed with coconut milk)

4.5.1.2 Rural area

Results from questionnaire and interview are described below and shown in Table 18.

60-90% of pregnant women likes the suggested foods. Most of pregnant women will consume if being suggested and will pass the information to other pregnant women.

Table 18. Opinion of pregnant women in rural area on the suggested locally available foods

description	FR1 (%)	FR2 (%)	FR3 (%)	FR4 (%)	FR5 (%)	FR6 (%)
Likability						
- Like	75.0	76.9	84.3	61.5	70.0	90.2
- Not like	25.0	23.1	15.7	38.5	30.0	9.8
Consume if being suggested						
- Consume	82.7	82.7	76.9	82.7	73.1	88.5
- Not consume	17.3	17.3	23.1	17.3	26.9	11.5
Cause: - Inconvenient	11.1	11.1	50.0	-	30.8	50.0
- No money	-	22.2	16.7	11.1	7.7	16.7
- Not prefer	88.9	66.7	33.3	88.9	61.5	33.3
Pass the information to others pregnant women						
- Pass	82.6	89.8	87.2	74.5	83.0	93.8
- Not pass	17.4	10.2	12.8	25.5	17.0	6.3

Remarks: FR1 = Small fishes fried

FR2 = Pork liver/ chicken liver grilled, fried, boiled or cooked

FR3 = Tao suan (dehulled mungbean in cooked cassava flour and cover with coconut milk)/ Pla tong ko (deep fried wheat flour dough)

FR4 = Grilled, fried, or cooked chicken-sparerib

FR5 = Steamed, fried or cooked pork sausage (moo-yor)

FR6 = Steamed pumpkin with coconut.

4.5.2 Food acceptability and practicality for each menu.

The developed menus in this study were distributed to pregnant women. Each menu was tested in 33 times for urban area and 34 times for rural area. Evaluation of the questionnaires revealed that some pregnant women did not follow food guideline. So, the number of subjects for each menu was changed to 30, 33 and 29 personnels for omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong), fried tofu with vegetables and pork (Tao hu shong krueng) and fried rice with canned sardines in tomato sauce (Khao phud pla-kra-pong), respectively. Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong), chicken curry with pumpkin (Khang gai sai fuktong) and glutinous rice cooked with dehulled mungbean and peanut (Khoa nheaw na tua) were tested by 32 personnels.

The results of acceptability and practicality test of the menus were as follows.

4.5.2.1 The opinion of the pregnant women on the food menu guideline prototype

The guideline prototype for each menu was rated understanding by 100% of the pregnant women for every menus both urban and rural area (Table 19).

Table 19. Opinion of the pregnant women on the food guideline prototype (%)

Opinion	Urban			Rural		
	PU1 (n=30)	PU2 (n=33)	PU3 (n=29)	PR1 (n=32)	PR2 (n=32)	PR3 (n=32)
Picture						
- Understanding	100	100	100	100	100	100
- Misunderstanding	-	-	-	-	-	-
Explanation						
- Understanding	100	100	100	100	100	100
- Misunderstanding	-	-	-	-	-	-
Overall						
- Understanding	100	100	100	100	100	100
- Misunderstanding	-	-	-	-	-	-

Remarks:

PU1 = Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)

PU2 = Fried tofu with vegetables and pork (Tao hu shong krueng)

PU3 = Fried rice with canned sardines in tomato sauce (Khao phud pla-kra-pong)

PR1 = Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)

PR2 = Chicken curry with pumpkin (Khang gai sai fuktong)

PR3 = Glutinous rice cooked with dehulled mungbean and peanut (Khoa nheaw na tua)

4.5.2.2 Opinion of the pregnant women on tested menus preparation (Table 20).

Generally, the convenience for acquisition of raw materials and cooking were convenient for every menus. Regarding the amount of raw materials, most of subjects answered that it was suitable in both areas except 50% of pregnant women in urban area thought that PU1 (Omelet with canned sardines in tomato sauce) was unsuitable and should modify for more suitable (43.3%). While 37.5% of pregnant women in rural area thought that PR1 (Omelet with canned sardines in tomato sauce) was unsuitable. However, about 72% of pregnant women in this area thought that no needs for recipes or cooking method modification for this menu.

Most of subjects in both areas will prepare these menus by themselves in the future.

Table 20. Opinion of the pregnant women on the tested menus preparation (%)

Opinion	Urban			Rural		
	PU1 (n=30)	PU2 (n=33)	PU3 (n=29)	PR1 (n=32)	PR2 (n=32)	PR3 (n=32)
1. Acquisition of raw materials						
- Convenience	96.7	90.9	96.6	78.1	71.9	65.6
- Inconvenience	3.3	9.1	3.4	21.9	28.1	34.4
2. Cooking method						
- Convenience	93.9	97.0	96.6	100	96.9	100
- Inconvenience	6.1	3.0	3.4	-	3.1	-
3. Amount of raw materials.						
- Suitable	50.0	87.9	79.3	62.5	81.3	87.5
- Unsuitable	50.0	12.1	20.7	37.5	18.7	12.5
4. Needs for recipe or cooking method modification						
- No need	56.7	90.9	65.5	71.9	75.0	81.3
- Need	43.3	9.1	34.5	28.1	25.0	18.8
5. Will pregnant women prepare this dish in future?						
- Will	90.0	90.0	89.7	78.1	81.3	78.1
- Will not	10.0	10.0	10.3	21.9	18.7	21.9

Remarks:

PU1 = Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)

PU2 = Fried tofu with vegetables and pork (Tao hu shong krueng)

PU3 = Fried rice with canned sardines in tomato sauce (Khao phud pla-kra-pong)

PR1 = Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)

PR2 = Chicken curry with pumpkin (Khang gai sai fuktong)

PR3 = Glutinous rice cooked with dehulled mungbean and peanut (Khoa nheaw na tua)

Table 21 shows the opinion on the modification of PU1 (Omelet with canned sardines in tomato sauce). It was found that 61.5% reported no need to add basil-leaves. Hence this menu must to improve before advice in food menu guideline.

Table 21. Opinion on the way of modification of PU1 (Omelet with canned sardines in tomato sauce)

Way of modification	percent
- Use pork instead canned sardines	23.1
- Reduce vegetable oil	7.7
- Do not add basil-leaves	61.5
- Add more egg	7.7

4.5.2.3 The opinion of pregnant women on the tested menus (Table 22)

The menus were rated attractive by more than 87% of the subjects. The acceptability of flavor was at least 56% for all menus.

Most of subjects consumed all of menu more than half dish and consumed with other foods except PU3 (Fried rice with canned sardines in tomato sauce) and PR3 (Glutinous rice cooked with dehulled mungbean and peanut) which consumed only this menu (69.0 and 68.8%).

More than 90% of subjects thought that these menus were suitable for advice to other pregnant women.

Table 22. Opinion of the pregnant women on the tested menus (%)

Opinion	Urban			Rural		
	PU1 (n=30)	PU2 (n=33)	PU3 (n=29)	PR1 (n=32)	PR2 (n=32)	PR3 (n=32)
1. General appearance of menus						
- Attractive	96.7	90.9	96.6	87.5	100	93.8
- Unattractive	3.3	3.1	3.4	12.5	-	6.2
2. Flavor of food						
- Like	56.7	72.7	76.0	65.7	90.7	62.5
- Neither like nor dislike	23.3	21.2	17.2	18.8	6.3	21.9
- Dislike	20.0	6.1	6.8	15.5	3.0	15.6
3. Amount of food that can eat						
- Less than half dish	6.7	15.2	6.9	12.5	6.3	34.4
- Half to more than half dish	93.4	84.9	93.1	87.5	93.8	65.6
4. Way of consumption						
- With other dishes	70.0	66.7	31.0	68.8	68.8	31.3
- Only this menu	30.0	33.3	69.0	31.3	31.3	68.8
5. Should the menu advised to other pregnant women?						
- Should	93.1	100	96.5	93.5	100	96.9
- Should not	6.9	-	3.6	6.5	-	3.1

Remarks:

PU1 = Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)

PU2 = Fried tofu with vegetables and pork (Tao hu shong krueng)

PU3 = Fried rice with canned sardines in tomato sauce (Khao phud pla-kra-pong)

PR1 = Omelet with canned sardines in tomato sauce (Khai jiew pla-kra-pong)

PR2 = Chicken curry with pumpkin (Khang gai sai fuktong)

PR3 = Glutinous rice cooked with dehulled mungbean and peanut (Khoa nheaw na tua)

4.6 Development of food menu guideline for pregnant women

Pregnant women in urban area suggested to modified PU1 (Omelet with canned sardines in tomato sauce) menu by not adding basil leaves. So, this menu was adjusted and the ingredients, weight and nutritive values of this menu were shown as follows;

Ingredients:

- Hen egg	1 egg
- Canned sardines in tomato sauce	1 piece
- Ivy gourd	5 tablespoons
- Vegetable oil	4 tablespoons
- Fish sauce	

Weight: 115 g.

Nutritive value:

Energy	336.1 kcal.	Calcium	204.3 mg.
Protein	15.1 g.	Iron	3.0 mg.
Fat	30.0 g.	Vitamin A	163.5 RE.

After that, food menu guideline was developed from each menu. This guideline divided into 6 parts.

1. Preface
2. Nutritional need during pregnancy period
3. Suggestion for daily life of pregnant women
4. Food menus for Thai pregnant women in Bangkok area
5. Food menus for Thai pregnant women in rural area
6. Food menus for Thai pregnant women in urban area

Part 4-6 shows the menus that developed in this study except, food menus for pregnant women in Bangkok area. These food menus composed of name, picture, ingredients, net weight, nutritive values and illustration of cooking method. These illustrations are easily to understand and suitable for pregnant women who can not read.

CHAPTER V

DISCUSSION

5.1 Information on demographics and nutrient intakes per day of pregnant women

The studied area in Ubonratchathani province could usually represent the poor rural area of the northeast. This study indicated that the purchasing power of the household in rural area was lower than in urban area. Consequently, there would be less money transaction, and variations in the eating pattern would be limited in the rural area. However, people in rural area could obtain their foods from other sources such as gathering from nature, production from their own lands and given by neighbors. Most of the times, the mentioned sources were significant sources of food for people in many rural areas of the country.

From 1963 to 1973, the consumption pattern of pregnant women in rural of Ubonratchathani Province that had energy distribution for protein, fat and carbohydrate as 11:4:85 was reported to be unchanged. Until 10 years later, the fat consumption in pregnant women was found increasing and the energy distribution for protein, fat and carbohydrate became 11:8:81. Such energy distribution ratio was consistent to what being found by Viriyapanich, T. et al. in 1986 (80). The latest study of Viriyapanich, T. et al. in 1999 found the energy distribution for protein, fat and carbohydrate was 13:8:79, the ratio was improved but still not high enough in the part of fat. Fat intakes are always insufficient. Fat and oil consumption was long

time known to be unacceptable for people in the northeast Thailand due to the unacceptable oily or rancid aroma.

For urban area, energy distribution for protein, fat and carbohydrate were in the suitable ratio. Average nutrient intake of pregnant women in urban area was higher than rural area in all categories except carbohydrate.

5.2 Food availability, cooking method and eating habits

5.2.1 Food availability

Urban area

In urban area, foods could be generally purchased in the market and supermarket where could be widely found. These foods were availability throughout the year. This might be due to easily access to the market. Moreover, better access to market might provide an opportunity to obtain more varieties of foods. Combining with the higher income of household in urban area, their food availability were generally better and had more choices than in the rural area.

Rural area

Only certain food items were obtained by purchasing from weekly market and small village grocery store. Mobile vendor was also another supplier of food to the villager even on daily basis in some areas. Not only that, people could find some foods from their own backyard garden. Some foods were given by the neighbors. Overall, food availability in rural area however was still worse than in urban area. This might be mainly due to lower purchasing power and transportation problem.

Fish is the commonest protein sources consumed in rural area. Studies in rural northeast of Thailand found the most fish consumed in the households were gathered

from natural sources, followed by purchasing. For other indigenous animal protein source, such as frogs, insects, tadpole, households in rural were not obtained only by gathering but also by purchasing. However, these indigenous animals were found seasonally. While other protein sources such as beef, pork were obtained only by purchasing (81,82). People in rural of the northeast Thailand usually did not consume beef and pork very often, only 2-3 times/month or during special events, since they were too expensive (83).

Even fat was not the favorable food for people in the rural northeast Thailand, however, the commercial fat sources such as vegetable oil and lard could still widely found in the local markets.

UHT Milk was the source of calcium, which was available in rural area. However, the product was not so much consumed by pregnant women. Drinking milk was not an eating habit for a grown up in the rural area, besides the price could be too high. Tofu another source of calcium was rarely available in rural area. The interesting sources of calcium which were more acceptable, available and worth to be considered in the rural area were canned sardine in tomato sauce, small dried fishes and chicken-sparerib.

For iron source, clam, ark-shell and pond snail were easily to gather in natural source and also purchased while availability of meat's organ and chicken's blood still limited.

The most concentrated source of vitamin A are liver, dark green and orange-yellow vegetables such as pumpkin, ivy gourd and amaranth spineless. These food sources were available in rural area.

5.2.2 Cooking method and eating habits

In general, all members of the rural family shared the meal; there was no special distribution of protein or other essential nutrients to pregnant women. Not only that, the typical meal consisted of cooked glutinous rice consumed with jeaw, vegetable and small amounts of fish but also, least of foods cook with oil or coconut milk. These lead to inadequate fat and other nutrient intake.

For urban area, cooking method and eating habits were similar to people in many urban areas in Thailand. Many foods were cooked with oil and coconut milk combined with more varieties and availability of foods than rural area. So, their nutritional statuses were better than pregnant women in rural area.

Pregnant women in both areas usually consumed desserts, fried foods, snacks, fruits, milks and dairy products and beverages. But pregnant women in rural area consumed these foods less than the urban area especially, milk and dairy products. It is clear that milk and dairy products are excellent sources of calcium. About 56% of pregnant women in rural area consumed milk and dairy products less than 1-3 times/week because of financially limited and did not prefer. These frequency of milk consumption still not enough to get adequate calcium for pregnant women.

5.3 Menu development and formulation

Popular and usually dishes of study area's food were selected from the raw data of 24 hrs recall (the survey of Viriyapanich, T. et al, 1999 : 77) and modified by primarily based on the results from the section 3.3 and report of Isaan food's recipe (78). So, developed menus were common and usually consumed by people in the studied areas. For other communities where, there was no information about recipes

of popular and common dishes, the additional step for menu development is to survey on popular dishes, recipes and the opinion of pregnant women on the way of cooking nutrient-rich sources.

Since the developed menus should provide lacked nutrients for pregnant women especially calcium and vitamin A, the menus chosen composed of calcium and vitamin A source such as canned sardines, tofu, pork's liver for urban area, and canned sardines, chicken sparerib and dark green vegetable for rural area. For rural area, because of canned sardines in tomato sauce and chicken-sparerib were available, not expensive and commonly consumed in this area, so these food sources were chosen to use in developed menus as recommendation for calcium rich sources to add more calcium content. Same reason of rural area, canned sardines in tomato sauce and tofu were chosen to use in menus for pregnant women in urban area. While small fried fishes was chosen to suggest for pregnant women in both areas.

Each menu should meet the nutritional goal that was already set (Table 15). Energy and nutritive values for each menu in Table 16 shows most of nutrients in developed menus for both areas. However, each menu could be only good sources for certain nutrients but not all.

It is not easy to provide the menus that can cover all nutrients which pregnant women still lacking in one dish. For example, to meet nutritional goal for rural area, omelet with canned sardines in tomato sauce, more of vegetable oil and canned sardines in tomato sauce must to be added to meet nutritional goal. If we do not increase egg, the proportion of egg and sardines will not be appropriated and this menu becomes unsatisfactory. In the other hand, if we increase egg in this menu, it is too bulk to eat.

So, each menu has high nutritive value for different nutrients. To rectify this problem, pregnant women should consume these menus with other nutrient rich foods, while variety and diversity of food still be importance. Nutritive values of developed menus for rural area were still less than the goal and nutritive values of urban's menus especially fat. In developing the menus, cooking method and eating habits must be taken into consideration. The rural pregnant women do not consumed fatty foods, if we add more fat, menus becomes unacceptable. However, food sources, which have more fat content, were chosen to use in each menu such as peanut and black sesame to add more fat in menu.

Because vitamin A can be stored by the body, daily intake is not necessary. A single serving of liver provides enough vitamin A for nine days (8). So, pregnant women should consume pork liver with chilies and basil leaves menu, grilled, fried, boiled or cooked pork liver/chicken liver once a week.

Suggested locally available foods, were mainly for high nutrient sources which those pregnant women still lacked especially calcium, vitamin A and fat for both areas.

5.4 Opinion of pregnant women on the suggested locally available foods

Most of pregnant women in rural area like all of suggested foods while half of pregnant women in urban area did not like some suggested foods such as small fried fishes, mhee kati and kanom tua pap. Due to more availability and more choices of food in urban area than rural area, so they can get more varieties of nutrient food sources to consume. If they do not like to eat some kind of food, they can find another

foods which has the same nutrient rich. While pregnant women in rural area can not do that because of kinds of food were limited. However, if locally available foods are promoted and more nutrition education is provided for pregnant women, percent of pregnant women who consume suggested locally available food will be increase.

5.5 Sensory acceptability and practicality tests

The target group of the study needs for the menu development was the pregnant women who live in the northeast of Thailand in both urban and rural area. The target group was randomly selected from village in study area. Therefore, the selected group represented those who actually cook and eat these menus. They would know the existing problem such as availability of all ingredients, income limitation, etc. and would be able to provide information on the characteristics of the menus needed for pregnant women.

5.5.1 Food acceptability and practicality for each menu

Theoretically, home use test needed 50-100 subjects per sample. However, the number of subjects in each studied area was limited about 50. Also, the number of sample be tested was limited to be only 2 samples for each subject. Therefore, the BIB design was used, and only 30 subjects tested each menu.

For the acceptability and practicality testing, it was conducted to find out whether the menu was practicable for normally life and acceptable for pregnant women. It is hard to control all the process and hard to know whether the subjects followed all food guideline prototypes to prepared foods, therefore the outcome may have some variability. To rectify this problem, we used some questions in questionnaire to

confirm the result. The questionnaire showed that some pregnant women did not follow all step of cooking which appear in guideline. For example, chicken curry with pumpkin, they put chicken in the pan before curry paste, which did not follow step in guideline. In this case we conceded that menu still practically. However, some subjects modified some menus to be other dishes such as they modified omelet with canned sardine in tomato sauce to be omelet and canned sardine spicy soup. We conceded this was missing case and did not include in the data.

Pregnant women cooked these menus by themselves, for this reason, results of acceptability testing showed that most pregnant women in both areas accepted the menus on the basis of the characteristic and flavor.

The amount of ingredients in each menu that were given to the subjects were more than enough for cooking in one dish, because it is hard to prepare all ingredients by exact amount that appears in guideline. For example, Fried rice with canned sardines in tomato sauce, 2 pieces of canned sardines was recommended but there were more than 2 pieces in one can. Most of the subjects used all sardines in the can. Not only canned sardines, but also most of other ingredients in all menus were used up. For this reason, the weight of each menu maybe increase and more bulk than menu that cooked in test kitchen. And hence, some pregnant women in both areas could not eat these menus up.

Some questions in the questionnaire led to positive answers and maybe the subjects were considerate of researcher's feeling such as " Will pregnant women prepare this dish in the future?" and " Should the menu advised to other pregnant women?". So, their answers were positive. However, there were only 2 questions that led to positive answers and the results from questionnaire showed most of pregnant

women consumed these menu more than half dish. Moreover, 3-4 days after testing for food acceptability and practicality, researcher went back to the studied areas and discussed with subjects about these menus again. The answers were still positive which confirmed the results that pregnant women like these menus.

5.6 Food menu guideline development

Guideline for healthy eating during pregnancy was a tip in the menu guideline. There are comprises of 6 parts as follow: Preface, nutritional need during pregnancy period, suggestion for daily life of pregnant women, food menus for Thai pregnant women in Bangkok, urban and rural of Ubonratchathani Province.

This guideline used easy words to be understood by general people and had illustrations with explanation step by step for cooking, amount of ingredients, nutritive values and pictures of finished dishes. So it should have effectiveness for using by pregnant women in community both urban and rural area. 1,000 copies of this food menu guideline were provided and distributed among pregnant women in communities both urban and rural northeast of Thailand and Bangkok areas.

CHAPTER VI

CONCLUSION

The developed guideline and menus were acceptable and practical for the target population both in urban and rural areas of the Ubonratchathani province. The menus could fulfill at least 70% of the daily requirement of a pregnant woman (if consumed these menus with usually dished) except calcium and fat. Milk, other calcium sources such as tofu, canned sardines in tomato source, small fried fish, grilled chicken-sparerib and fat sources are therefore suggested while, other locally available dishes and desserts were also conditional choices.

In process of the guideline development, the following steps were however needed.

1. Survey on demographics information and nutrient intakes per day of pregnant women in the study area.
2. Survey on the available food sources, way of cooking, eating habit, popular dishes, recipes and opinion about way of cooking nutrient-rich sources of pregnant women in the study area.
3. Develop appropriate menus for pregnant women based on the survey information.
4. Develop a prototype for food guideline.
5. Test for food guideline practicality and sensory acceptability of the menus
6. Modify the menus and guideline

The food guideline and menus for pregnant women in the urban and rural areas of Ubonratchathani Province has already been publicized.

Recommendations

1. This model can also be used as a guideline for developing appropriate food menus for pregnant women in other communities.

2. By using this guideline, more varieties of dishes could be also cooked by using the recommended nutrient rich sources.

3. The recommended food menus needed to be updated occasionally in order to include the new food items available in the market.

4. It was recommended to consume various kinds of dish since each dish could be only good sources for certain nutrients but not all.

5. Certain nutrients such as calcium, iron could not be obtained from traditional dishes, therefore modification of recipes or supplementation might be needed, for example substitute coconut milk with evaporated milk, iron tablet supplementation.

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APPENDIX A

MAP OF UBONRATCHATHANI PROVINCE

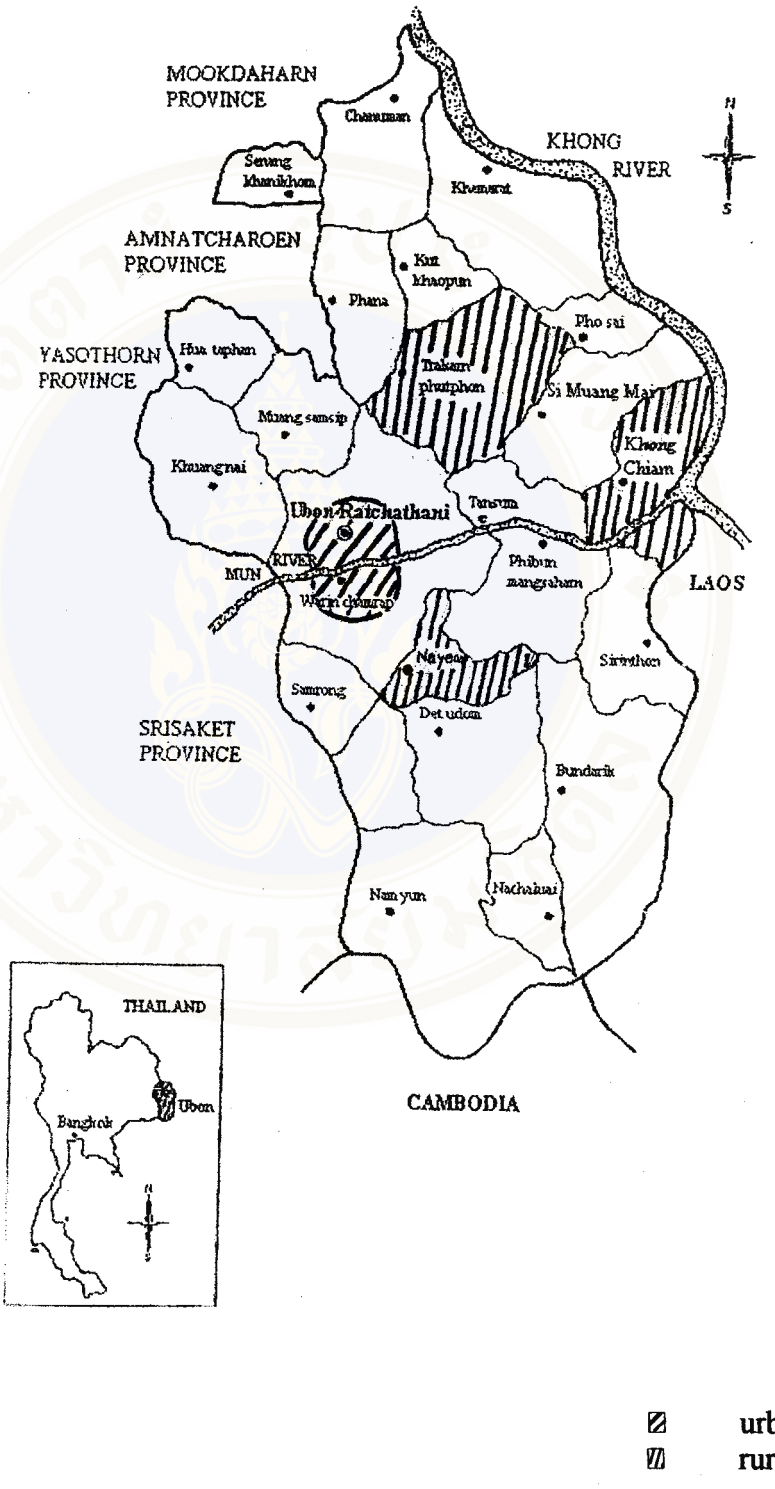


Figure 15. Map of study areas (shady areas) in Ubonratchathani Province

APPENDIX B

QUESTIONNAIRES USED IN THE SURVEY OF AVAILABLE FOOD SOURCES AND EATING HABITS

APENDIX B1

HOUSEHOLD FOOD SURVEY FORM

แบบสำรวจอาหารเสริมหญิงตั้งครรภ์

สถานที่สำรวจ.....ตำบล.....อำเภอ.....จังหวัด.....

วันที่สำรวจ.....เวลา.....ชื่อผู้สำรวจ.....

ชนิด/ชื่ออาหาร	ส่วนประกอบหลัก	ขนาดบรรจุ ราคา/หน่วย	ความนิยม, ความสะดวกในการซื้อหา/ผลิต/มีตลอดปี
1. อาหารพร้อมกิน			
1.1 อาหารว่าง			
1.2 กับข้าว			
2. อาหารสำเร็จรูป/กึ่งสำเร็จรูป			

แบบสำรวจอาหารเสริมหญิงตั้งครรภ์

สถานที่สำรวจ.....ตำบล.....อำเภอ.....จังหวัด.....

วันที่สำรวจ..... *เวลา.....* *ชื่อผู้สำรวจ.....*

ชนิด/ชื่ออาหาร	ส่วนประกอบหลัก	ขนาดบรรจุ ราคา/หน่วย	ความนิยม, ความสะดวกในการซื้อหา/ผลิต/มีตลอดปี
3. อาหารสด			
3.1 ผลไม้/ผักกินสดที่มี			
ตลอดปี			
3.2 ผลไม้/ผักกินสด			
ตามฤดู			

แบบสำรวจอาหารเสริมหญิงตั้งครรภ์

สถานที่สำรวจ.....ตำบล.....อำเภอ.....จังหวัด.....

วันที่สำรวจ..... *เวลา.....* *ชื่อผู้สำรวจ.....*

ชนิด/ชื่ออาหาร	ส่วนประกอบหลัก	ขนาดบรรจุ ราคา/หน่วย	ความนิยม, ความสะดวกในการซื้อหา/ผลิต/มีตลอดปี
4. อาหารสดนำมาปรุง			
4.1 เนื้อสัตว์/ไข่/ปลา			
4.2 ผัก			

แบบสำรวจอาหารเสริมหญิงตั้งครรภ์

สถานที่สำรวจ.....ตำบล.....อำเภอ.....จังหวัด.....

วันที่สำรวจ..... *เวลา.....* *ชื่อผู้สำรวจ.....*

ชนิด/ชื่ออาหาร	ส่วนประกอบหลัก	ขนาดบรรจุ ราคา/หน่วย	ความนิยม, ความสะดวกในการซื้อหา/ผลิต/มีตลอดปี
5. อื่นๆ			
นม			
นมถั่วเหลือง			
เต้าหู้			
อาหารทะเล.....			
เลือดหมู/ไก่			
ตับ			
งา			

APPENDIX B2

EATING HABIT OF PREGNANT WOMEN QUESTIONNAIRE

ID.....

แบบสัมภาษณ์โครงการอาหารเสริมหญิงตั้งครรภ์

ชื่อ / นามสกุล ..... อายุ ..... ปี

อายุครรภ์.....เดือน มีอาการแพ้หรือไม่.....อย่างไร.....

อ่านหนังสือได้หรือไม่.....ถ้าไม่ได้มีคนช่วยอ่านหรือไม่.....

บ้านเลขที่.....หมู่บ้าน.....ตำบล.....อำเภอ.....จ.อุบลราชธานี

1. อาชีพหลักของครอบครัว

☐ ทำนา-ไร่ ☐ รับราชการ

☐ ค้าขาย ☐ รับจ้าง

☐ แม่บ้าน ☐ อื่นๆ เช่น เลี้ยงสัตว์, โรงสี

2. รายได้ครอบครัวต่อเดือนโดยประมาณ (ถามเฉพาะในเมือง)

☐ < 3,000 บาท ☐ 3,001-5,000 บาท

☐ 5,001-10,000 บาท ☐ > 10,000 บาท

3. เศรษฐานะ (ผู้สัมภาษณ์สังเกตเอง)

ขนาดของบ้าน ☐ ใหญ่ ☐ ปานกลาง ☐ เล็ก

ความมั่นคงของบ้าน ☐ ดี ☐ พอใช้ ☐ มั่นคง

สมบัติภายในบ้าน ☐ พัดลม ☐ ตู้เย็น ☐ หม้อหุงข้าวไฟฟ้า ☐ โทรทัศน์

☐ แอร์ ☐ เครื่องเล่นเทป ☐ พาหนะ ระบุ.....คัน

4. การศึกษาสูงสุดของหญิงตั้งครรภ์

☐ ไม่ได้เรียน/ ไม่จบประถม ☐ ป.1-ป.6 ☐ ม.1-ม.6

☐ ป.ว.ช.-ป.ว.ส. ☐ ปริญญาตรี/สูงกว่า

5. รูปร่างของหญิงตั้งครรภ์ (ผู้สัมภาษณ์สังเกตเอง)

☐ ผอม ☐ ปกติ ☐ อ้วน ☐ อ้วนมาก

6. มีอาหารอะไรบ้างที่ท่าน (หญิงตั้งครรภ์) กินไม่ได้,กินไม่เป็น หรือแพ้ (แพ้อาหาร)

เนื้อสัตว์ต่างๆ ☐ กินได้หมด ☐ กินไม่ได้บางอย่าง ระบุ.....

ผักต่างๆ ☐ กินได้หมด ☐ กินไม่ได้บางอย่าง ระบุ.....

ถั่วและผลิตภัณฑ์ ☐ กินได้หมด ☐ กินไม่ได้บางอย่าง ระบุ.....

ผลไม้ ☐ กินได้หมด ☐ กินไม่ได้บางอย่าง ระบุ.....

อื่นๆ.....☐ กินได้หมด ☐ กินไม่ได้บางอย่างระบุ.....

7. ขณะตั้งครรภ์ท่านชอบกินอะไรมากเป็นพิเศษ (ไม่เอาช่วงแพ้ท้อง).....

8. คนปรุงอาหารในบ้านส่วนใหญ่เป็นใคร

☐ หญิงตั้งครรภ์ ☐ ผู้อื่น ระบุ.....

ID.....

ชนิดของอาหารที่กินช่วงตั้งครรภ์ (ระบุชื่ออาหาร 1-2 ชนิด)	ความถี่ในการกิน				วิธีการในการจัดหามากิน			สาเหตุที่ไม่กิน			
	ไม่เคยกิน	กินทุกวัน	สัปดาห์ละ 1-3 ครั้ง	เดือนละ 1-3 ครั้ง	ซื้อ	ทำเอง/ปลูก	มีคนให้	หากินยาก	ไม่หิว	ไม่ชอบ	ไม่มีเงินซื้อ
1. ขนมหวาน ระบุ.....											
2. อาหารทอด ระบุ.....											
3. ขนมถุง ระบุ.....											
4. ผลไม้ ระบุ.....											
5. นมและผลิตภัณฑ์ ระบุ.....											
6. เครื่องดื่ม ระบุ.....											

ผู้สัมภาษณ์.....วันเดือนปีที่สัมภาษณ์.....

APPENDIX C

PROTOTYPE OF THE FOOD MENU GUIDELINE

ตำรับอาหารเสริมหญิงตั้งครรภ์

ไข่เจียวปลากระป๋อง

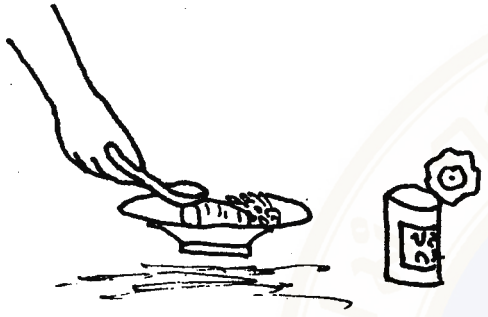
<u>ส่วนประกอบ</u>

-ไข่ไก่	1 ฟอง
- ปลากระป๋อง (เอาแต่เนื้อ)	1 ชิ้นใหญ่
- ผักตำลึง	3 ช้อนกินข้าว
- โหระพา	2 ช้อนกินข้าว
- น้ำมันพืช	4 ช้อนกินข้าว
- น้ำปลาสำหรับปรุงรส	

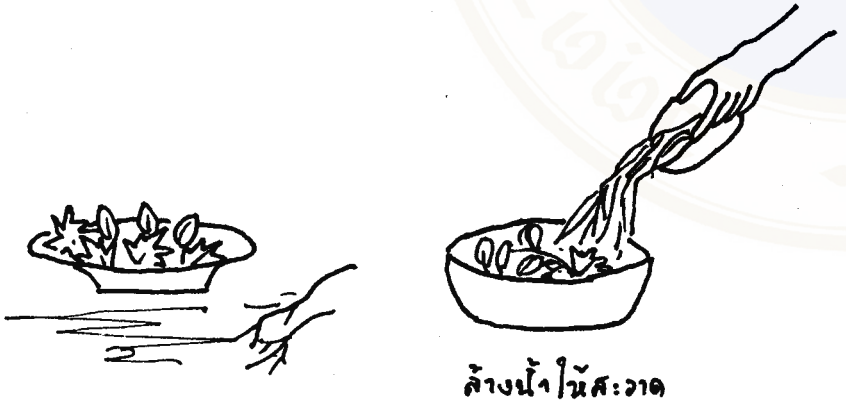
PR.1

วิธีทำ

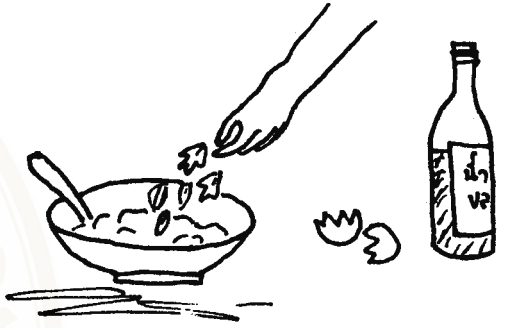
1. ยีเนื้อปลากระป๋องเป็นชิ้นเล็กๆ



2. ล้างใบตำลึง, ใบโหระพา เด็ดให้เป็นใบๆ



3. ตีไข่ใส่เนื้อปลา,ใบตำลึง และใบโหระพา ตีให้เข้ากัน ปรุงรสตามชอบ



4 นำน้ำมันใส่กระทะ รอให้ร้อนแล้วเจียวไข่

ไข่เจียวปลากระป๋อง (น้ำหนัก 115 กรัม)

คุณค่าทางโภชนาการ

พลังงาน	336.5 kcal.
โปรตีน	15.1 g.
ไขมัน	30.0 g.
แคลเซียม	205.9 mg.
เหล็ก	2.9 mg.
วิตามินเอ	156.9 RE.

โครงการพัฒนาสูตรอาหารเสริมที่เหมาะสมสำหรับหญิงตั้งครรภ์

สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล

ตำรับอาหารเสริมหญิงตั้งครรภ์

แกงไก่ใส่ฟักทอง

<u>ส่วนประกอบ</u>

- เนื้อไก่สับเป็นชิ้น 2 ทัพพี
- ผักโขมหั่นเป็นท่อนๆ 1 ทัพพี
- ฟักทองหั่นเป็นชิ้นๆ 2 ทัพพี
- ใบแมงลักเด็ดเป็นใบๆ 2 ช้อนกินข้าว
- น้ำมันพืช 1 ช้อนกินข้าว
- น้ำปลา, น้ำปลาร้า, น้ำสะอาด

<u>เครื่องแกง</u>

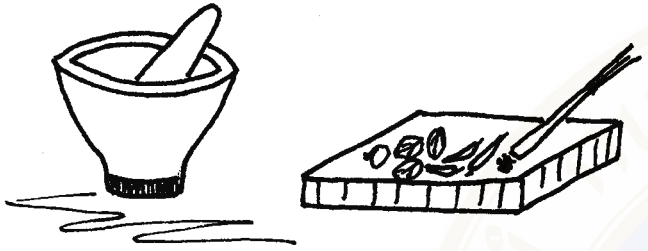
- ตะไคร้หั่นฝอย 1 ช้อนกินข้าว
- พริกขี้หนูแห้ง 5-6 เม็ด
- ใบมะกรูด 3 ใบ
- หอมแดงซอย 1 หัว
- เกลือป่นเล็กน้อย

โขลกเครื่องแกงทั้งหมดรวมกันให้ละเอียด

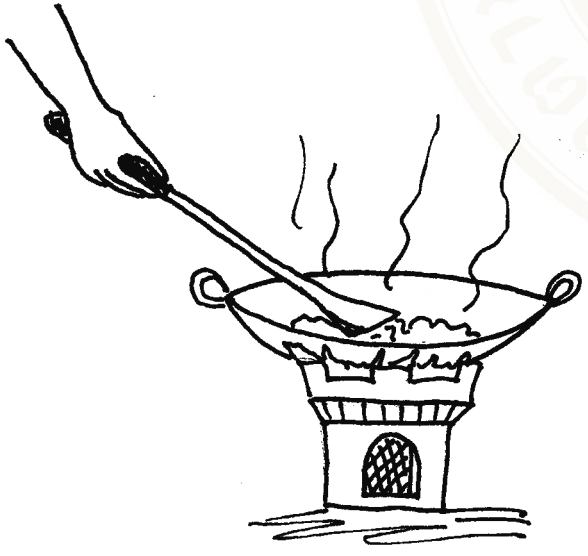
PR.2

วิธีทำ

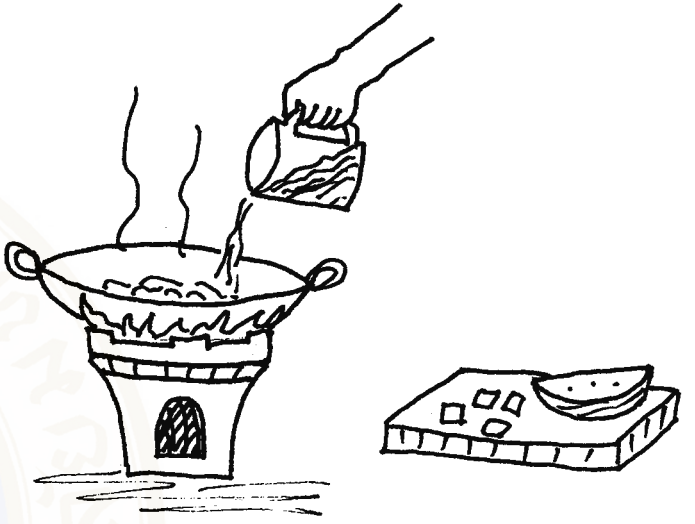
1. โขลกเครื่องแกงทั้งหมดรวมกันให้ละเอียด



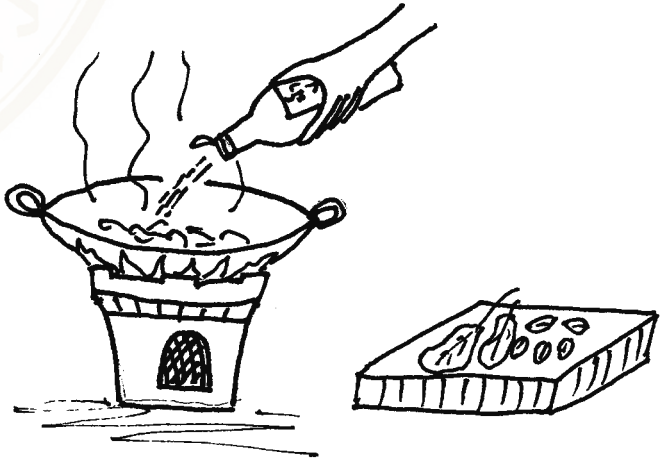
2. ตั้งกระทะใส่น้ำมัน รอให้ร้อน ใส่ไก่, ผัดพอแห้ง ใส่น้ำพริกแกง ผัดให้เข้ากัน



3. ใส่น้ำพอท่วม เมื่อเดือดใส่ฟักทอง รอให้ฟักทองสุก



4. ปรุงรสด้วยน้ำปลา, น้ำปลาร้า ใส่ผักโขมและใบแมงลัก คนให้เข้ากัน ปิดไฟ



แกงไก่ใส่ฟักทอง (น้ำหนัก 432 กรัม)

คุณค่าทางโภชนาการ

พลังงาน	414.2 kcal.
โปรตีน	40.4 g.
ไขมัน	18.3 g.
แคลเซียม	88.2 mg.
เหล็ก	5.1 mg.
วิตามินเอ	453.5 RE.

โครงการพัฒนาสูตรอาหารเสริมที่เหมาะสมสำหรับหญิงตั้งครรภ์

สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล

ตำรับอาหารเสริมหญิงตั้งครรภ์

ข้าวเหนียวหน้าถั่ว

<u>ส่วนประกอบ</u>

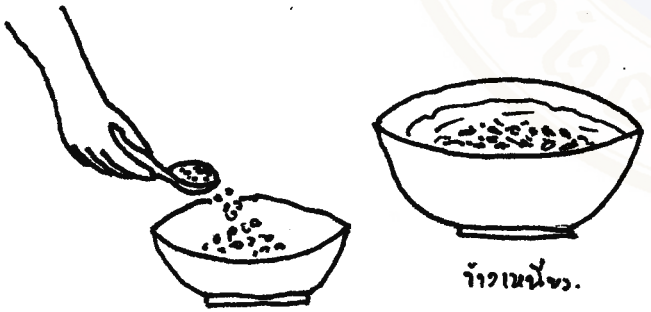
- ถั่วลิสง 1 ช้อนกินข้าว
- ถั่วทอง 1 ช้อนกินข้าว
- กุ้งแห้ง 1 ช้อนกินข้าว
- ข้าวเหนียว 5 ช้อนกินข้าว
- น้ำมันพืช 1 ช้อนกาแฟ
- เกลือ, น้ำตาล เล็กน้อย

PR.3

วิธีทำ

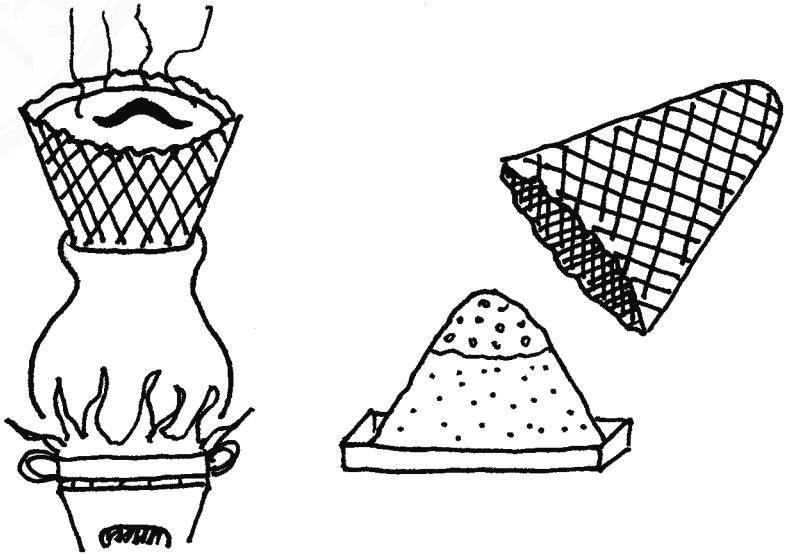
1. แช่ถั่วลิสงในน้ำสะอาดประมาณ 6 ชั่วโมง ตักเอาแต่เนื้อ แช่ถั่วทองในน้ำสะอาดประมาณ 2 ชั่วโมง ตักเอาแต่เนื้อ

2. ตักข้าวเหนียวที่แช่น้ำสำหรับไว้นึ่งกิน ประมาณ 5 ช้อนกินข้าว (ตักเอาแต่ข้าว ไม่เอาน้ำ)



3. ผสมถั่วลิสง, ถั่วทอง,ข้าวเหนียว, กุ้งแห้ง, น้ำมันพืช เกลือป่น และน้ำตาล ให้เข้ากัน

4. ใส่ส่วนผสมทั้งหมดลงก้นหวด แล้วใส่ข้าวเหนียวที่จะนึ่งทับ นึ่งประมาณ 20-30 นาที คว่ำหวดลง ข้าวเหนียวหน้าถั่วจะอยู่ข้างบน ตักใส่จาน



ข้าวเหนียวหน้าถั่ว (น้ำหนัก 159 กรัม)

<u>คุณค่าทางโภชนาการ</u>

พลังงาน	382.7 kcal.
โปรตีน	13.9 g.
ไขมัน	11.8 g.
แคลเซียม	192.9 mg.
เหล็ก	3.0 mg.
วิตามินเอ	0.96 RE.

โครงการพัฒนาสูตรอาหารเสริมที่เหมาะสมสำหรับหญิงตั้งครรภ์

สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล

ตำรับอาหารเสริมหญิงตั้งครรภ์

ไข่เจียวปลากระป๋อง

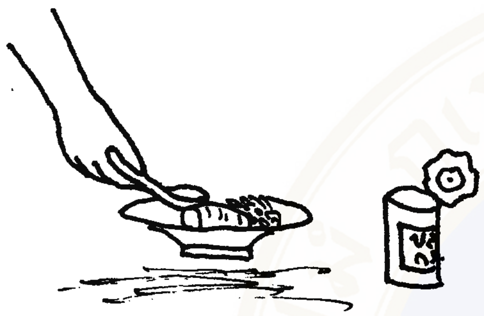
<u>ส่วนประกอบ</u>

-ไข่ไก่	1 ฟอง
- ปลากระป๋อง (เอาแต่เนื้อ)	1 ชิ้นใหญ่
- ผักตำลึง	3 ช้อนกินข้าว
- โหระพา	2 ช้อนกินข้าว
- น้ำมันพืช	4 ช้อนกินข้าว
- น้ำปลาสำหรับปรุงรส	

PU.1

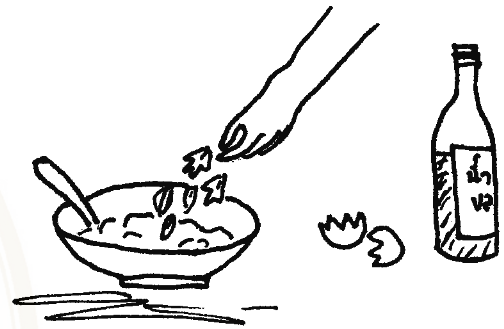
<u>วิธีทำ</u>

1. ยีเนื้อปลากระป๋องเป็นชิ้นเล็กๆ



2. ล้างใบตำลึง, ใบโหระพา เด็ดให้เป็นใบๆ

3. ตีไข่ใส่เนื้อปลา,ใบตำลึง และใบโหระพา ตีให้เข้ากัน ปรุงรสตามชอบ



4. นำน้ำมันใส่กระทะ รอให้ร้อนแล้วเจียวไข่

ไข่เจียวปลากระป๋อง (น้ำหนัก 115 กรัม)

<u>คุณค่าทางโภชนาการ</u>

พลังงาน	336.5 kcal.
โปรตีน	15.1 g.
ไขมัน	30.0 g.
แคลเซียม	205.9 mg.
เหล็ก	2.9 mg.
วิตามินเอ	156.9 RE.

โครงการพัฒนาสูตรอาหารเสริมที่เหมาะสมสำหรับหญิงตั้งครรภ์

สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล

ตำรับอาหารเสริมหญิงตั้งครรภ์

เต้าหู้ทรงเครื่อง

<u>ส่วนประกอบ</u>

- เต้าหู้แข็งหั่นเป็นชิ้น	1 ก้อน
- หมูสับ	3 ช้อนกินข้าว
- ต้นหอมหั่นเป็นท่อน	1 ทัพพี
- แครอทหั่นเป็นเส้น	2 ช้อนกินข้าว
- พริกหยวกหั่นเป็นเส้น	2 ช้อนกินข้าว
- กระเทียมสับ	2 ช้อนกินข้าว
- น้ำมันพืช	3 ช้อนกินข้าว

- น้ำปลา, น้ำตาลสำหรับปรุงรส

PU.2

วิธีทำ

1. ตั้งกระทะ ใส่น้ำมันรอให้ร้อน ทอดเต้าหู้ให้เหลือง ตักขึ้นให้สะเด็ดน้ำมัน ใส่จาน

2. เจียวกระเทียมให้เหลือง ใส่หมูสับ ผัดพอสุก จากนั้นจึงใส่แครอท พริกหยวก

3. ปรุงรสตามชอบ ใส่ต้นหอม ผัดให้เข้ากัน ปิดไฟ

4. นำเครื่องที่ผัดเรียบร้อยแล้ว ราดลงบนเต้าหู้ที่เตรียมไว้

เต้าหู้ทรงเครื่อง (น้ำหนัก 237 กรัม)

คุณค่าทางโภชนาการ	
พลังงาน	442.4 kcal.
โปรตีน	28.4 g.
ไขมัน	31.9 g.
แคลเซียม	318.2 mg.
เหล็ก	9.6 mg.
วิตามินเอ	372.1 RE.

โครงการพัฒนาสูตรอาหารเสริมที่เหมาะสมสำหรับหญิงตั้งครรภ์

สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล

ตำรับอาหารเสริมหญิงตั้งครรภ์

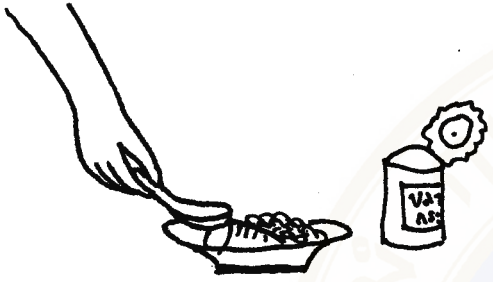
ข้าวผัดปลากระป๋อง

ส่วนประกอบ	
- ข้าวสวย	2 ทัพพี
- ปลากระป๋อง (ตักเอาแต่เนื้อ ไม่เอาน้ำ)	2 ชิ้น
- พักทองหั่นเป็นลูกเต๋า	2 ช้อนกินข้าว
- แครอทหั่นเป็นลูกเต๋า	2 ช้อนกินข้าว
- หอมใหญ่หั่นเป็นลูกเต๋า	2 ช้อนกินข้าว
- ผักคะน้าหั่นเป็นชิ้นๆ	1 ทัพพี
- ผักชี	1 ต้น
- กระเทียมสับละเอียด	2 ช้อนกินข้าว
- น้ำมันพืช	3 ช้อนกินข้าว
- น้ำปลา, น้ำตาลสำหรับปรุงรส	

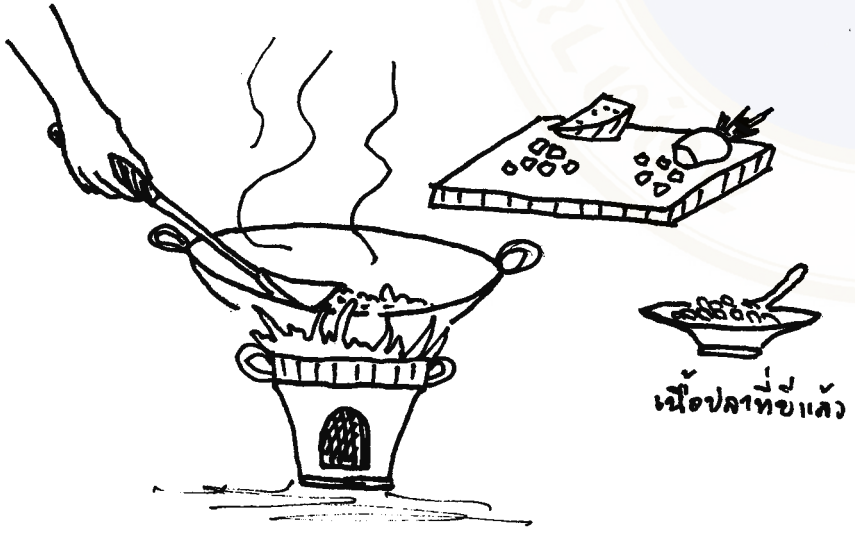
PU.3

วิธีทำ

1. ตักเอาแต่เนื้อปลากระป๋อง(ไม่เอาน้ำ)ยีให้เป็นชิ้นเล็กๆ



2. เจียวกระเทียมให้เหลือง ใส่ปลากระป๋อง, ฟักทอง, แครอท ผัดพอสุก



3. ใส่ข้าวสวย, หอมใหญ่, ผักคะน้า ผัดให้เข้ากัน ปรุงรส

4. ตักใส่จาน โรยหน้าด้วยผักชีที่เตรียมไว้

ข้าวผัดปลากระป๋อง (น้ำหนัก 417 กรัม)

<u>คุณค่าทางโภชนาการ</u>

พลังงาน	502.5 kcal.
โปรตีน	20.4 g.
ไขมัน	21.2 g.
แคลเซียม	310.8 mg.
เหล็ก	5.3 mg.
วิตามินเอ	388.9 RE.

โครงการพัฒนาสูตรอาหารเสริมที่เหมาะสมสำหรับหญิงตั้งครรภ์

สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล

APPENDIX D

QUESTIONNAIRE FOR THE ACCEPTABILITY AND PRACTICALITY TESTS

ID.....

แบบสัมภาษณ์โครงการอาหารเสริมหญิงตั้งครรภ์ (ผู้สัมภาษณ์ถาม)

สูตรอาหาร.....

ชื่อ / นามสกุล ..... อายุ .....ปี อายุครรภ์.....เดือน

บ้านเลขที่.....หมู่บ้าน.....ตำบล.....อำเภอ.....จ.อุบลราชธานี

คู่มือและการเตรียมอาหาร (สัมภาษณ์ผู้รับผิดชอบในการปรุงอาหาร)

◆ คู่มือ

1. คู่มือที่แจกให้ ดูแล้วเข้าใจหรือไม่

ดูรูปภาพแล้ว ☐ เข้าใจชัดเจน

☐ ไม่เข้าใจ ระบุภาพที่ไม่เข้าใจ.....

ควรแก้ไขอย่างไร.....

คำอธิบายอ่านแล้ว☐ เข้าใจชัดเจน

☐ ไม่เข้าใจ ระบุข้อความที่ไม่เข้าใจ.....

ควรแก้ไขอย่างไร.....

โดยรวมคู่มือนี้อ่านแล้ว

☐ เข้าใจ ไม่ต้องแก้ไข

☐ ไม่เข้าใจ ต้องแก้ไข

ควรแก้ไขอย่างไร.....

2. ขอให้ท่านเล่าขั้นตอนการปรุงอาหารเมนูนี้มาให้อย่างละเอียด

.....

.....

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.....

.....

◆ การเตรียมอาหาร

3. ส่วนประกอบต่างๆในเมนูนี้ ท่านคิดว่ายุ่งยากหรือไม่ในการจัดหามาทำเอง

☐ ไม่ยุ่งยาก

☐ ยุ่งยาก (ระบุชนิดของส่วนประกอบ และเหตุผลที่ยุ่งยาก)

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.....

.....

4. ปริมาณของส่วนประกอบแต่ละชนิดที่ระบุในคู่มือ มีอะไรบ้างที่ไม่เหมาะสม อย่างไร

.....

.....

5. ท่านคิดว่าควรจะมีการดัดแปลงอาหารสูตรนี้หรือไม่อย่างไร

.....

.....

6. ท่านชอบอาหารที่แนะนำให้ทำนี้หรือไม่

☐ ชอบ เพราะ.....

☐ ไม่ชอบ เพราะ.....

การรับประทาน (สัมภาษณ์หญิงตั้งครรภ์)

7. อาหารที่ปรุงเมนูนี้ ได้กินกันกี่คน

☐ หญิงตั้งครรภ์คนเดียว (ตอบข้อ 8 ต่อ)

☐ หญิงตั้งครรภ์ กับคนอื่นๆ.....คน (ข้ามไปตอบข้อ9)

8. ถ้ากินคนเดียว กินหมดหรือไม่

☐ หมด ☐ ภายใน 1 มื้อ ระบุมื้อ.....

☐ กินหลายครั้ง ระบุ.....ครั้ง

☐ ไม่หมด

9. กรณีที่กินกันหลายคนหรือกินไม่หมด หญิงตั้งครรภ์กินอาหารเมนูนี้ได้ประมาณเท่าใด

☐ น้อยกว่าครึ่ง เพราะ.....

☐ ครึ่งหนึ่ง/มากกว่าครึ่ง เพราะ.....

10. ท่านกินอาหารจานนี้ร่วมกับอาหารอื่นๆอย่างไรบ้าง

☐ กินร่วมกับกับข้าวอื่นๆ ระบุชนิดของกับข้าว.....

☐ กินอาหารเมนูนี้อย่างเดียว

☐ อื่นๆ ระบุ.....

11. ท่านคิดว่าอาหารเมนูนี้มีประโยชน์เหมาะสำหรับแนะนำหญิงตั้งครรภ์อื่นๆหรือไม่

☐ เหมาะ เพราะ.....

☐ ไม่เหมาะ เพราะ.....

ผู้สัมภาษณ์.....วันเดือนปีที่สัมภาษณ์.....

ID.....

แบบสอบถามโครงการอาหารเสริมหญิงตั้งครรภ์(หญิงตั้งครรภ์นำกลับไปตอบที่บ้าน)

สูตรอาหาร.....

ชื่อ / นามสกุล ..... อายุ .....ปี อายุครรภ์.....เดือน

บ้านเลขที่.....หมู่บ้าน.....ตำบล.....อำเภอ.....จ.อุบลราชธานี

การเตรียมอาหาร(ผู้รับผิดชอบในการปรุงอาหารตอบ)

1. วิธีปรุงมีความยุ่งยากหรือไม่

☐ ยุ่งยาก

☐ ไม่ยุ่งยาก

2. ถ้าให้ทำเองโดยไม่มีใครจัดหามาให้ ท่านคิดว่าจะทำหรือไม่

☐ ทำ

☐ ไม่ทำ

3. การซื้อหามาทำเองครั้งต่อไป

☐ สะดวก หาง่าย

☐ ไม่สะดวก

การรับประทาน (ให้หญิงตั้งครรภ์ตอบ)

อาหารที่ทำขึ้นมานี้

4. ท่านคิดว่าน่ากินหรือไม่

☐ น่ากิน

☐ ไม่น่ากิน

5. ท่านชอบรสชาติหรือไม่

☐ ☐ ☐ ☐ ☐

ไม่ชอบมาก ไม่ชอบ เฉยๆ ชอบ ชอบมาก

6. ท่านกินอาหารจานนี้ในมื้อใด

☐ เช้า ☐ เย็น

☐ เที่ยง ☐ ระหว่างมื้อ

7. กินอาหารเมนูนี้ร่วมกับอาหารอื่นหรือไม่

☐ กินอาหารนี้อย่างเดียว

☐ กินร่วมกับอาหารอื่นๆด้วย

ID.....

อาหารสำหรับแนะนำในช่วงตั้งครรภ์

1. โครงไก่ปิ้ง/ทอด หรือหมกซี่โครงไก่

ท่านเคยกินหรือไม่ ☐ เคย ☐ ไม่เคย

ถ้าเคยกิน กินบ่อยแค่ไหน ☐ กินทุกวัน ☐ สัปดาห์ละ 1-3 ครั้ง ☐ เดือนละ 1-3 ครั้ง

ท่านกินอาหารนี้ได้ครั้งละเท่าใด .....ถ้วย/ชิ้น/ไม้

ท่านชอบกินอาหารนี้หรือไม่

☐ ไม่ชอบมาก ☐ ไม่ชอบ ☐ เฉยๆ ☐ ชอบ ☐ ชอบมาก

ถ้าแนะนำให้กินอาหารนี้ท่านจะกินหรือไม่ ☐ กิน ☐ ไม่กิน

ถ้าไม่กินเพราะ ☐ หาซื้อยาก ☐ ทำได้ยาก ☐ ไม่ชอบ ☐ ไม่มีเงินซื้อ

ท่านคิดว่าอาหารนี้ควรแนะนำให้หญิงตั้งครรภ์อื่นๆกินหรือไม่ ☐ ควร ☐ไม่ควร

2. ตับไก่/ตับหมู (ปิ้ง/ทอด/ผัด/ต้ม)

ท่านเคยกินหรือไม่ ☐ เคย ☐ ไม่เคย

ถ้าเคยกิน กินบ่อยแค่ไหน ☐ กินทุกวัน ☐ สัปดาห์ละ 1-3 ครั้ง ☐ เดือนละ 1-3 ครั้ง

ท่านกินอาหารนี้ได้ครั้งละเท่าใด .....ถ้วย/ชิ้น/ไม้

ท่านชอบกินอาหารนี้หรือไม่

☐ ไม่ชอบมาก ☐ ไม่ชอบ ☐ เฉยๆ ☐ ชอบ ☐ ชอบมาก

ถ้าแนะนำให้กินอาหารนี้ท่านจะกินหรือไม่ ☐ กิน ☐ ไม่กิน

ถ้าไม่กินเพราะ ☐ หาซื้อยาก ☐ ทำได้ยาก ☐ ไม่ชอบ ☐ ไม่มีเงินซื้อ

ท่านคิดว่าอาหารนี้ควรแนะนำให้หญิงตั้งครรภ์อื่นๆกินหรือไม่ ☐ ควร ☐ไม่ควร

3. หมูยอ (นึ่ง/ทอด)

ท่านเคยกินหรือไม่ ☐ เคย ☐ ไม่เคย

ถ้าเคยกิน กินบ่อยแค่ไหน ☐ กินทุกวัน ☐ สัปดาห์ละ 1-3 ครั้ง ☐ เดือนละ 1-3 ครั้ง

ท่านกินอาหารนี้ได้ครั้งละเท่าใด .....ถ้วย/ชิ้น/ไม้

ท่านชอบกินอาหารนี้หรือไม่

☐ ไม่ชอบมาก ☐ ไม่ชอบ ☐ เฉยๆ ☐ ชอบ ☐ ชอบมาก

ถ้าแนะนำให้กินอาหารนี้ท่านจะกินหรือไม่ ☐ กิน ☐ ไม่กิน

ถ้าไม่กินเพราะ ☐ หาซื้อยาก ☐ ทำได้ยาก ☐ ไม่ชอบ ☐ ไม่มีเงินซื้อ

ท่านคิดว่าอาหารนี้ควรแนะนำให้หญิงตั้งครรภ์อื่นๆกินหรือไม่ ☐ ควร ☐ไม่ควร

4. ปลาตัวเล็กทอดกรอบ

ท่านเคยกินหรือไม่ ☐ เคย ☐ ไม่เคย

ถ้าเคยกิน กินบ่อยแค่ไหน ☐ กินทุกวัน ☐ สัปดาห์ละ 1-3 ครั้ง ☐ เดือนละ 1-3 ครั้ง

ท่านกินอาหารนี้ได้ครั้งละเท่าใด .....ถ้วย/ชิ้น/ไม้

ท่านชอบกินอาหารนี้หรือไม่

☐ ไม่ชอบมาก ☐ ไม่ชอบ ☐ เฉยๆ ☐ ชอบ ☐ ชอบมาก

ถ้าแนะนำให้กินอาหารนี้ท่านจะกินหรือไม่ ☐ กิน ☐ ไม่กิน

ถ้าไม่กินเพราะ ☐ หาซื้อยาก ☐ ทำได้ยาก ☐ ไม่ชอบ ☐ ไม่มีเงินซื้อ

ท่านคิดว่าอาหารนี้ควรแนะนำให้หญิงตั้งครรภ์อื่นๆกินหรือไม่ ☐ ควร ☐ไม่ควร

5. เต้าส่วน/ปาท่องโก๋

ท่านเคยกินหรือไม่ ☐ เคย ☐ ไม่เคย

ถ้าเคยกิน กินบ่อยแค่ไหน ☐ กินทุกวัน ☐ สัปดาห์ละ 1-3 ครั้ง ☐ เดือนละ 1-3 ครั้ง

ท่านกินอาหารนี้ได้ครั้งละเท่าใด .....ถ้วย/ชิ้น/ไม้

ท่านชอบกินอาหารนี้หรือไม่

☐ ไม่ชอบมาก ☐ ไม่ชอบ ☐ เฉยๆ ☐ ชอบ ☐ ชอบมาก

ถ้าแนะนำให้กินอาหารนี้ท่านจะกินหรือไม่ ☐ กิน ☐ ไม่กิน

ถ้าไม่กินเพราะ ☐ หาซื้อยาก ☐ ทำได้ยาก ☐ ไม่ชอบ ☐ ไม่มีเงินซื้อ

ท่านคิดว่าอาหารนี้ควรแนะนำให้หญิงตั้งครรภ์อื่นๆกินหรือไม่ ☐ ควร ☐ไม่ควร

6. ฟักทองนึ่งโรยมะพร้าว

ท่านเคยกินหรือไม่ ☐ เคย ☐ ไม่เคย

ถ้าเคยกิน กินบ่อยแค่ไหน ☐ กินทุกวัน ☐ สัปดาห์ละ 1-3 ครั้ง ☐ เดือนละ 1-3 ครั้ง

ท่านกินอาหารนี้ได้ครั้งละเท่าใด .....ถ้วย/ชิ้น/ไม้

ท่านชอบกินอาหารนี้หรือไม่

☐ ไม่ชอบมาก ☐ ไม่ชอบ ☐ เฉยๆ ☐ ชอบ ☐ ชอบมาก

ถ้าแนะนำให้กินอาหารนี้ท่านจะกินหรือไม่ ☐ กิน ☐ ไม่กิน

ถ้าไม่กินเพราะ ☐ หาซื้อยาก ☐ ทำได้ยาก ☐ ไม่ชอบ ☐ ไม่มีเงินซื้อ

ท่านคิดว่าอาหารนี้ควรแนะนำให้หญิงตั้งครรภ์อื่นๆกินหรือไม่ ☐ ควร ☐ไม่ควร

ผู้สัมภาษณ์.....วันเดือนปีที่สัมภาษณ์.....

APPENDIX E

NUTRIENT CONTENT PER SERVING SIZE OF THE SUGGESTED LOCALLY AVAILABLE FOODS

Suggested foods	Serving size (g)	Nutrient content/serving size					
		Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vit.A (mg. RE)
1. Small fried fishes	35	117.3	20.5	3.6	**595**	0.7	-
2. Pork liver[1]	13	15.2	2.6	0.4	1.4	1.4	**677.7**
3. chicken liver[1]	13	18.7	2.3	0.9	1.3	0.6	**1472.3**
4. Mhee kati	290	**672.8**	10.4	**34.5**	49.3	5.2	40.6
5. Kanom tua pap	95	**240.4**	4.8	2.9	40.0	1.4	0.1
6. Tao suan	207	**345.7**	4.1	6.2	29.0	1.4	2.1
7. Pla tong ko	18	76.7	1.4	4.3	-	-	-
8. Khao tom phud	63	**226.8**	5.7	2.5	22.7	1.3	-
9. Grilled chicken-spararib	30	78.3	6.5	4.5	**172.4**	0.6	11.3
10. Steamed pork sausage	60	158.4	9.5	**13.4**	0.2	1.1	-
11. Steamed pumpkin with coconut	133	176.8	2.5	5.9	7.9	0.4	**209.5**

[1] A single serving of liver provides enough vitamin A for nine days. So, pregnant women should consume liver once per week

Bold numbers show the significant amounts of nutrients in suggested food.

BIOGRAPHY

NAME	Miss Piyarat Tunwetchasin
DATE OF BIRTH	24th February 1976
PLACE OF BIRTH	Satun, Thailand
INSTITUTE ATTENED	Prince of Songkhla University : Bachelor of Science (biotechnology), 1996 Institute of Nutrition, Mahidol University : Master of Science (Food and Nutrition for development), 2000